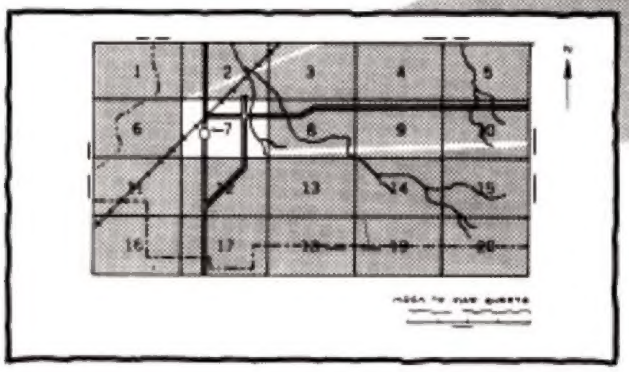
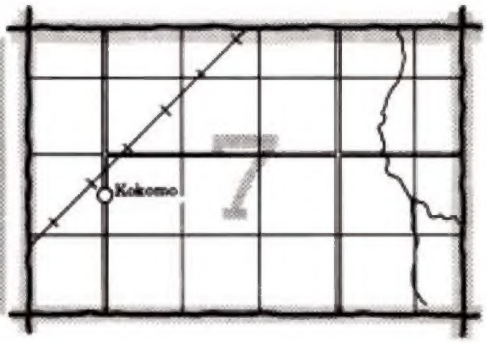
Soil Survey of Latimer County Oklahoma

United States Department of Agriculture
Soil Conservation Service
in cooperation with
Oklahoma Agricultural Experiment Station

HOW TO USE

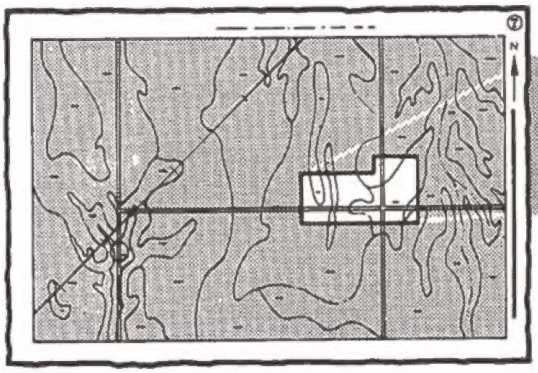
1. Locate your area of interest on the "Index to Map Sheets"

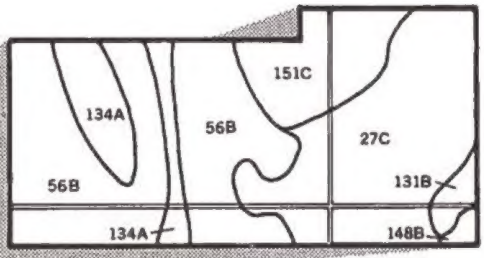




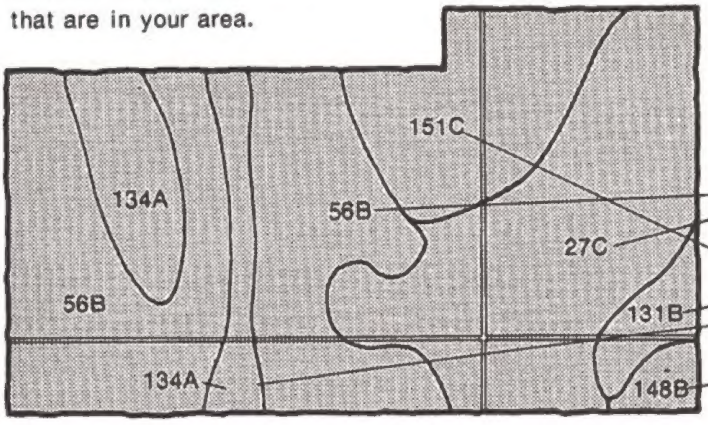
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area.

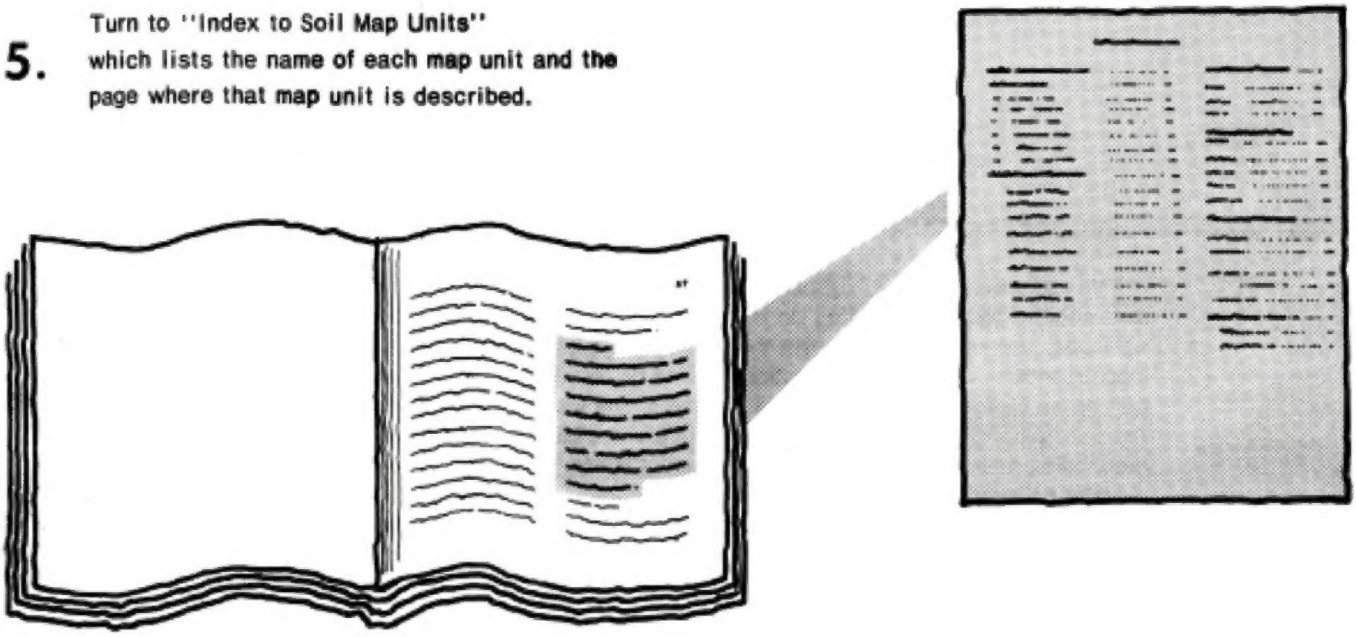


Symbols

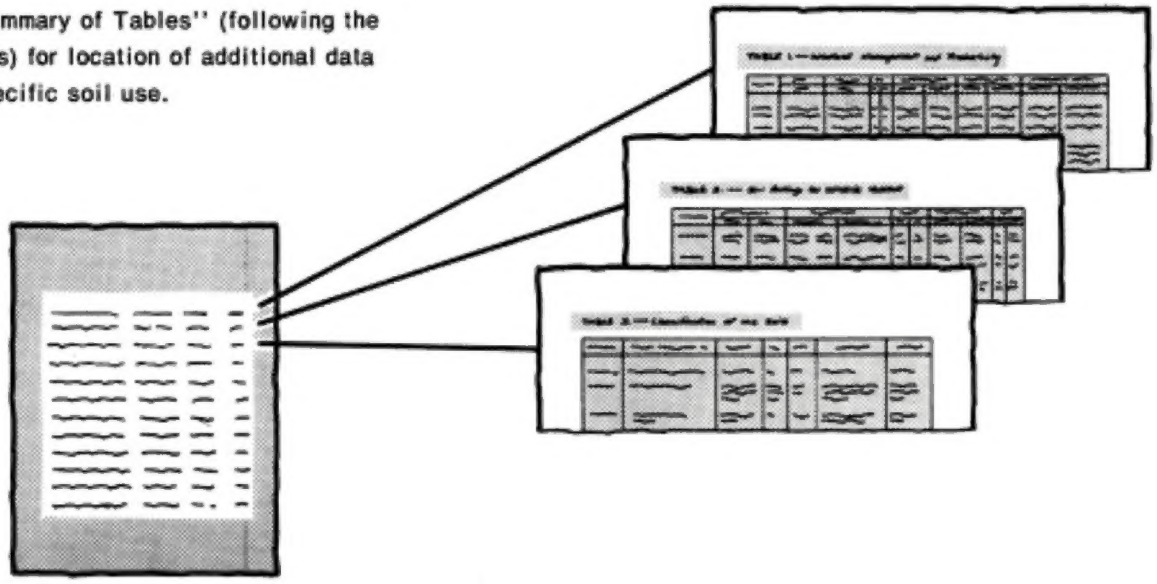
27C
56B
131B
134A
148B
151C

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1972 to 1979. Soil names and descriptions were approved in 1979. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1979. This survey was made cooperatively by the Soil Conservation Service and the Oklahoma Agricultural Experiment Station. It is part of the technical assistance furnished to the Latimer County Conservation District and the Talihina Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Beef cattle grazing pasture on Stigler silt loam, 0 to 1 percent slopes.

contents

soil series

Issued December 1981

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summary of tables

foreword

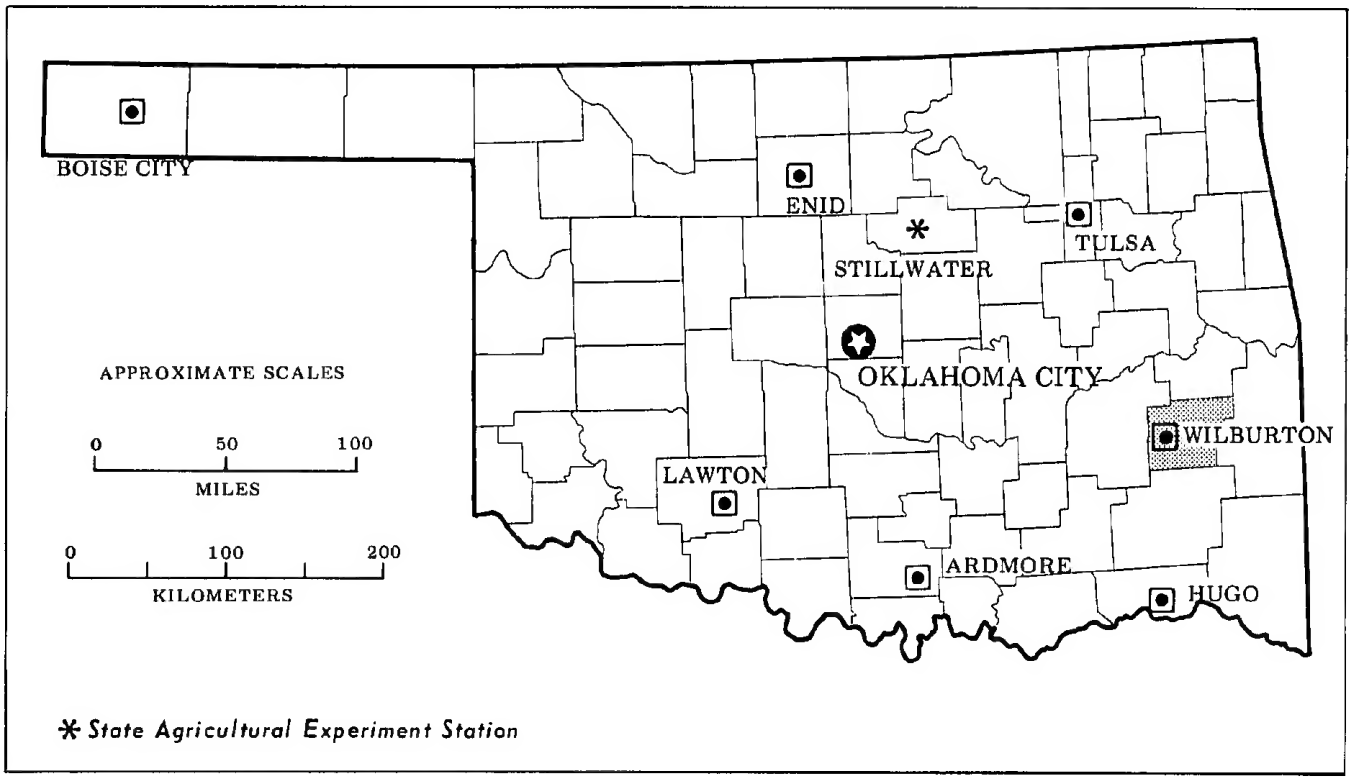
This soil survey contains information that can be used in land-planning programs in Latimer County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Roland R. Willis
State Conservationist
Soil Conservation Service



Location of Latimer County in Oklahoma.

Soil survey of
Latimer County, Oklahoma

By R.C. Brinlee and R. Clay Wilson, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
in cooperation with Oklahoma Agricultural Experiment Station

LATIMER COUNTY is in the southeastern part of Oklahoma. It is bounded on the north by Haskell County, on the east by LeFlore County, on the south by Pushmataha County, and on the west by Pittsburg County. It has an area of 737 square miles, or 471,680 acres. Wilburton is the county seat.

general nature of the survey area

This section gives general information concerning the survey area. It describes climate; physiography, drainage, and relief; settlement and development; and natural resources.

climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Latimer County is hot in summer, especially at low elevations, and moderately cool in winter, especially on mountains and high hills. Rainfall is fairly heavy and well distributed throughout the year. Snow falls nearly every winter, but snow cover lasts only a few days.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Wilburton, Oklahoma, in the period 1951 to 1976. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 43 degrees F, and the average daily minimum temperature is 30 degrees. The lowest temperature on record, which occurred at Wilburton on February 2, 1951, is -16 degrees. In summer the average temperature is 80 degrees, and the average daily maximum temperature is 93 degrees. The highest recorded temperature, which occurred on July 13, 1954, is 111 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 46 inches. Of this, 27 inches, or 59 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 7.7 inches at Wilburton on August 15, 1964. Thunderstorms occur on about 60 days each year in the county, and most occur in summer.

Average seasonal snowfall is 5 inches. The greatest snow depth at any one time during the period of record was 6 inches. On an average of 2 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 10 miles per hour, in March.

physiography, drainage, and relief

Latimer County is mainly in the Ouachita Mountain and Arkansas Valley and Ridges physiographic regions. The topography ranges from level on the flood plains of Gaines and Fourche Maline Creeks to steep in areas of the Sans Bois and Winding Stair Mountains. The general slope is to the south and east. Fourche Maline Creek drains most of the eastern part of the county, Gaines Creek drains most of the western part, and Jackfork and Buffalo Creeks drain most of the southern part of the county. Brazil Creek drains a large area in the northeastern part of the county, and Sans Bois Creek drains a small area in the extreme northern part of the county.

The average elevation is approximately 1,200 feet above sea level. Buffalo Mountain, in the southern part of the county, reaches a height of 2,137 feet. The lowest point in the county, about 510 feet above sea level, is on the Latimer-LeFlore County line where Fourche Maline Creek leaves the county.

settlement and development

The early settlers in Latimer County were mostly Choctaw Indians. Most of the early settlers were subsistence farmers. Timber, cotton, grain sorghum, peanuts, and small grain were the main cash crops. Other crops were grown as feed for chickens, horses, mules, hogs, and beef and dairy cattle.

The trend in the last few decades has been toward livestock enterprises, mainly beef cattle. Acreage in cropland has declined, and formerly cultivated areas have been converted to tame pasture.

natural resources

The natural resources of the county are mainly soil, water, timber, natural gas, coal, and wild game and fish.

Soil, the most important natural resource in the county, produces grass and timber crops and is a source of sand and gravel.

Water for towns comes mainly from reservoirs and wells. Flood control reservoirs furnish water for recreation and irrigation. Farm ponds supply water for livestock needs.

Income from timber is substantial, although it is much below its potential. Most of the woodlands have been cut over several times, and the trees that were left to propagate the stands are of poor quality. Some of the stands of native shortleaf pine that contain enough trees to manage are being improved. In many areas, improved varieties of pine are being planted and the stand is being managed for increased production.

Natural gas and coal industries furnish additional income. Most of the natural gas comes from deep wells in the northern part of the county. Coal is strip mined from beds that crop out in the central part of the county.

Wildlife and game are abundant in the survey area. Deer, quail, dove, rabbit, squirrel, and duck are hunted in season.

Numerous clear running streams, small ponds, and lakes provide recreation for thousands of vacationers each year. Visitors are most numerous in the Robbers Cave State Park area (fig. 1) during spring and summer.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, rangeland and woodland managers, engineers, planners, developers and builders, home buyers, and others.

Figure 1.—Lake Carlton in Robbers Cave State Park is enjoyed by many vacationers. The soil is Sallisaw loam, 1 to 3 percent slopes.

general soil map units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

soil descriptions

1. Carnasaw-Clebit-Denman

Deep and shallow, gently sloping to steep, stony, well drained loamy soils; on mountains and ridges

This map unit consists of gently sloping to steep, stony soils on the mountains and ridges. The soils formed in material weathered from shale or sandstone under a cover of trees. The slope range is 3 to 45 percent.

This map unit makes up about 66 percent of the county. It is about 46 percent Carnasaw soils, 10 percent Clebit soils, 9 percent Denman soils, and 35 percent soils of minor extent.

Carnasaw soils are mainly on the gently sloping to steep side slopes of mountains and ridges. These deep, well drained soils have a stony fine sandy loam surface layer and a reddish clay subsoil. They have numerous large stones on and in the surface layer.

Clebit soils are mainly on the gently sloping to steep ridgetops and mountaintops, but they also occur on narrow benches on the mountainsides. These shallow, well drained soils have a stony fine sandy loam surface layer and have a brownish stony loam subsoil over hard sandstone. They have many fragments of sandstone throughout.

Denman soils are mainly on the strongly sloping to moderately steep lower side slopes and foot slopes of mountains. These deep, well drained soils have a stony loam surface layer and have a brownish, reddish, and gray clay loam to clay subsoil. They have numerous large stones on and in the surface layer.

Of minor extent in this unit are Bengal, Ceda, Octavia, Panama, Pirum, Pickens Variant, Shermore, and Wilburton soils.

The soils in this unit are used mainly for woodland or range and are best suited to these uses. The primary use is for woodland, although much of the area is used as grazing land for beef cattle. Most areas support hardwood and pine of merchantable quality, but timber production is much below its potential. Many areas are planted to improved tree varieties and are managed for increased production.

The soils in this unit mainly have low potential for farming and tame pasture. Large surface stones and steep slopes are the main limitations. The potential for woodland use and native grass is medium. Large stones and steep slopes are the main limitations to woodland management and equipment use.

The potential is low for residential and other urban uses. Large surface stones, shrink-swell potential, slow movement of effluent in the soil, and slope are the main limitations to overcome.

2. Stigler-Counts-Tamaha

Deep, dominantly nearly level to gently sloping, moderately well drained loamy soils; on broad valley floors

This map unit consists of mostly nearly level to gently sloping soils on broad valley floors. The soils formed in material weathered from shale or clayey sediments under an open cover of trees and grass. Slopes are mostly 0 to 5 percent.

This map unit makes up about 9 percent of the county. It is about 43 percent Stigler soils, 27 percent Counts soils, 12 percent Tamaha soils, and 18 percent soils of minor extent.

Stigler soils are in broad, nearly level to very gently sloping areas. These deep, moderately well drained soils have a thick silt loam surface layer and a brownish silty clay subsoil.

Counts soils are mostly on nearly level to gently sloping broad flats and side slopes. These deep, moderately well drained soils have a silt loam surface layer and a brownish and grayish, mottled clay subsoil.

Tamaha soils are on very gently sloping to gently sloping side slopes along drains or low ridges in the valleys. These deep soils have a silt loam surface layer and a brownish silty clay loam and silty clay subsoil.

Of minor extent in this unit are Cupco, Dela, Kanima, Neff, Rexor, Sobol, Wing, and Woodson Variant soils. Also within the area are numerous small oval mounds that have soils similar to Stigler, Counts, and Tamaha soils. These soils commonly have a thicker surface layer and are more loamy in the upper part of the subsoil than Stigler, Counts, or Tamaha soils.

The soils in this map unit are used mainly for tame pasture, range, and hayland. The forage and hay are utilized mostly by beef cattle.

The soils in this unit mainly have high potential for farming and tame pasture. Crops that could be grown are small grain, soybeans, and grain sorghum. Bermudagrass, tall fescue, and bahiagrass are adapted tame pasture grasses. The main management problems are maintaining soil structure, controlling erosion, reducing surface crusting, and improving soil fertility. The potential for native grass is high. The quality of these grasses can be improved by proper stocking, grazing control, and fire prevention. The soils in this unit have medium potential for woodland use. There are no significant limitations to this use.

The potential is low for residential and other urban uses. The high shrink-swell potential, slow permeability, and wetness are the main limitations to overcome.

3. Sobol-Tuskahoma-Wister

Shallow to deep, very gently sloping to moderately steep, moderately well drained loamy soils; mainly on low ridges in broad valleys

This map unit consists of very gently sloping to moderately steep soils mainly on low ridges. The soils formed in materials weathered from shale under a cover of grass. The slope range is 1 to 20 percent.

This map unit makes up about 6 percent of the county. It is about 34 percent Sobol soils, 28 percent Tuskahoma soils, 12 percent Wister soils, and 26 percent soils of minor extent.

Sobol soils are on the very gently sloping to moderately steep side slopes and crests of low ridges. These moderately deep, moderately well drained soils have a silt loam surface layer and a brownish to gray clay loam to clay subsoil over tilted shale.

Tuskahoma soils are on sloping to moderately steep side slopes and crests of low ridges. These shallow, moderately well drained soils have a stony loam surface layer and a brownish to grayish clay and shaly clay subsoil over tilted shale.

Wister soils are in very gently sloping valleys below low ridges. They are deep soils that have a silt loam surface layer and a brownish clay subsoil over tilted shale.

Of minor extent in this unit are Clebit, Counts, Cupco, Neff, Pirum, Shermore, and Yanush soils.

The soils in this map unit are used mostly for range and tame pasture. They are best suited to these uses.

The soils in this unit mainly have low potential for farming. The erosion hazard, slope, and stones are the major limitations. Crops can be grown on the deep, very gently sloping Wister soils. The potential is medium for native grass and low for tame pasture. Wister soils are the most productive soils for native grass and tame pasture grass. The main management problems are stones and maintaining soil fertility.

These soils have low potential for woodland use. Under natural conditions trees do not grow to any significant height.

The potential is low for residential and other urban uses. The high shrink-swell potential, slow permeability, slope, and depth to shale are the main limitations to overcome.

4. Yanush-Bigfork

Deep and moderately deep, very gently sloping to steep, cherty and stony, well drained loamy soils; on ridges and outwash fans

This map unit consists of very gently sloping to steep, cherty and stony soils on ridges and outwash fans. The soils formed in material weathered from chert, sandstone, and shale under a cover of trees. The slope range is 1 to 45 percent.

This map unit makes up about 5 percent of the county. It is about 40 percent Yanush soils, 20 percent Bigfork soils, and 40 percent soils of minor extent.

Yanush soils are mainly on the very gently sloping to steep lower part of side slopes, toe slopes, and outwash fans. These deep, well drained soils have a cherty silt loam surface layer and a reddish very cherty clay loam subsoil. They have many chert fragments on and in the soil.

Bigfork soils are mainly on the steep crests and upper part of side slopes of ridges and knobs. These moderately deep, well drained soils have a stony silt loam surface layer that contains many chert fragments. The subsoil is brownish very cherty clay loam over interbedded chert, shale, and sandstone.

Of minor extent in this unit are Ceda, Clodine Variant, Sobol, Tuskahoma, and Wilburton Variant soils.

The soils in this unit are used mainly for woodland, tame pasture, or range. The area is best suited to these uses. Much of the area produces hardwood and pine of merchantable quality, although production is much below its potential.

The soils in this unit mainly have low potential for farming and tame pasture. The steep slope, erosion hazard, brush, and stones are limitations to management and equipment use. Some of the gently sloping to sloping areas can be successfully used for tame pasture. The potential for native grasses is medium.

The potential for woodland use is low for most of the area. The steep slopes, erosion hazard, equipment

limitations, and seedling mortality are the major limitations.

The potential is low for residential and other urban uses. The steep slopes, surface stones, and shrink-swell potential are the main limitations to overcome.

5. Shermore-Wilburton-Sallisaw

Deep, very gently sloping to moderately steep, moderately well drained and well drained loamy soils; on foot slopes, outwash fans, and terraces

This map unit consists of very gently sloping to moderately steep soils on foot slopes, outwash fans, and terraces. The soils formed in loamy sediment weathered from sandstone and shale. The slope range is from 1 to 20 percent.

This map unit makes up about 6 percent of the county. It is about 36 percent Shermore soils, 21 percent Wilburton soils, 12 percent Sallisaw soils, and 31 percent soils of minor extent.

Shermore soils are mainly on very gently sloping to gently sloping foot slopes and outwash fans in broad valleys. These deep, moderately well drained soils have a fine sandy loam surface layer and a brownish clay loam subsoil with a brittle pan in the lower part.

Wilburton soils are mainly on very gently sloping to moderately steep terraces and outwash fans in broad valleys. These deep, well drained soils have a brown cobbly loam surface layer and a reddish very cobbly sandy clay loam subsoil with many fragments of sandstone.

Sallisaw soils are on very gently sloping outwash terraces. These deep, well drained soils have a loam surface layer and a brownish clay loam subsoil that is very gravelly in the lower part.

Of minor extent in this unit are Bernow Variant, Bengal, Carnasaw, Clebit, Freestone Variant, and Pirum soils.

The soils in this map unit are used mainly for tame pasture and range. Some areas are used as woodland.

The soils in this unit mainly have high potential for farming. A moderate erosion hazard and maintaining fertility are the major concerns in farm management. The potential for native grass and tame pasture grass is medium. Controlling brush and maintaining fertility are the major concerns in grass management.

The potential for woodland use is medium. Most of the area has no significant limitations for woodland use or management.

The potential is medium for residential and other urban uses. Wetness and small stones are the main limitations to overcome.

6. Neff-Rexor-Cupco

Deep, nearly level and very gently sloping, moderately well drained to somewhat poorly drained loamy soils; on flood plains

This map unit consists of nearly level and gently sloping soils on flood plains. The soils formed in loamy alluvium under a cover of trees. The slope range is 0 to 3 percent.

This map unit makes up about 8 percent of the county. It is about 35 percent Neff soils, 25 percent Rexor soils, 19 percent Cupco soils, and 21 percent soils of minor extent.

Neff soils are on the nearly level and very gently sloping parts of the flood plain. These deep, moderately well drained soils have a silt loam surface layer and a brownish silty clay loam subsoil.

Rexor soils are on the nearly level and very gently sloping parts of the flood plain. These deep, moderately well drained soils have a silt loam surface layer and have a brownish subsoil that is silty clay loam in the upper part and silt loam in the lower part.

Cupco soils are on the nearly level lower parts of the flood plain. These deep, somewhat poorly drained soils have a silt loam surface layer and a brownish silty clay loam subsoil.

Of minor extent in this unit are Ceda, Dela, and Kenn soils.

Most of the acreage in this unit is used for tame pasture. A small acreage is cultivated to soybeans, small grain, and grain sorghum. Some areas are used as woodland.

The soils in this unit mainly have high potential for farming. Flooding and maintaining soil fertility are major concerns in farm management. The potential is high for native grass and tame pasture. Flooding, maintaining soil fertility, and controlling brush are the major concerns in grass management.

The potential for woodland is high. Wetness is the only limitation in the somewhat poorly drained parts of the flood plain.

Because of the risk of damaging floods and wetness, this unit does not have potential for residential and urban building sites.

detailed soil map units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Yanush cherty silt loam, 1 to 3 percent slopes, is one of several phases in the Yanush series.

Some map units are made up of two or more major soils. These map units are called soil complexes, soil associations, or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Tuskahoma-Sobol complex, 3 to 8 percent slopes, is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Bengal-Denman association, moderately steep, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Neff and Rexor silt loams is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

soil descriptions

1—Bengal-Clebit complex, 3 to 8 percent slopes. This complex consists of areas of well drained, moderately deep Bengal soils and well drained, shallow Clebit soils that are so intermingled that they could not be separated at the scale selected for mapping. The Bengal soils are on side slopes, and the Clebit soils are on ridgetops of lower mountains. They are in long, narrow areas of 40 to 150 acres. Areas of each soil are less than 5 acres.

The Bengal soil makes up about 65 percent of each mapped area. Typically, the surface layer is dark brown stony loam in the upper 4 inches and dark yellowish brown stony loam to a depth of 8 inches. The upper part of the subsoil, to a depth of 24 inches, is red clay. The lower part of the subsoil, to a depth of 32 inches, is yellowish brown clay. Olive brown shale that is tilted 50 degrees from horizontal is below the subsoil.

The Bengal soil is low in natural fertility and organic matter content. It is medium acid to very strongly acid in the surface layer and strongly or very strongly acid in the subsoil. Permeability is slow, and available water capacity is medium.

The Clebit soil makes up about 20 percent of each mapped area. Typically, the surface layer is dark grayish brown stony fine sandy loam about 5 inches thick. The subsoil, to a depth of 16 inches, is strong brown stony fine sandy loam. Hard sandstone that is tilted 40 degrees from horizontal is below the subsoil.

The Clebit soil is low in natural fertility and organic matter content. It is slightly acid to strongly acid in the surface layer and slightly acid to very strongly acid in the subsoil. Permeability is moderately rapid, and available water capacity is very low.

Included in mapping are areas of Sobol and Pirum soils. The Sobol and Pirum soils are on side slopes. The included soils make up about 10 percent of this complex, but each soil is in areas of less than 5 acres. Also included are outcrops of sandstone that make up about 5 percent of each mapped area.

The soils in this complex have low potential for row crops and small grain. Large stones on the surface and shallowness to bedrock are limitations that are very difficult to overcome.

The soils are best suited to grass or woodland. They have medium potential for native grass and low potential for tame pasture. Stones on the surface are too numerous for preparation of a seedbed and the use of equipment. The quality and quantity of native grass can be maintained or improved by brush control, proper grazing, and fire prevention. Where it is practical to remove stones from the surface, tame pasture grasses can be grown.

The soils in this complex have low potential for woodland. The use of equipment is restricted because of large stones. Seedling mortality is also a concern in woodland management. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

The soils in this complex have low potential for most urban uses. Shallowness to rock and high shrink-swell potential are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, small commercial buildings, and dwellings.

This complex is in capability subclass VIIs and woodland group 5x. The Bengal part is in the Sandy Savannah range site, and the Clebit part is in the Shallow Savannah range site.

2—Bengal-Denman association, moderately steep. This association consists of well drained, moderately deep Bengal soils and well drained, deep Denman soils that occur in a regular and repeating pattern. These soils are on the northern and southern sides of lower mountains. The Bengal soil is on the upper part of side slopes and on rounded ridgetops, and the Denman soil is on the lower part of side slopes and on foot slopes. The mapped areas are mainly long and narrow and range from 40 to 400 acres. Areas of each soil are 2 to 20 acres. Slopes are 8 to 20 percent.

The Bengal soil makes up about 60 percent of each mapped area. Typically, the surface layer is dark brown stony loam in the upper 3 inches and brown stony loam to a depth of 7 inches. The upper part of the subsoil, to a depth of 10 inches, is strong brown stony clay loam. The middle part, to a depth of 22 inches, is yellowish red clay mottled in shades of brown. The lower part of the subsoil, to a depth of 29 inches, is gray shaly clay mottled in shades of red and brown. The underlying material is olive gray shale tilted 30 degrees from horizontal.

The Bengal soil is low in natural fertility and organic matter content. It is medium acid to very strongly acid in the surface layer and strongly acid or very strongly acid in the subsoil. Permeability is slow, and available water capacity is medium.

The Denman soil makes up about 20 percent of each mapped area. Typically, the surface layer is brown stony loam about 5 inches thick. The upper 5 inches of the subsoil is yellowish red stony loam. The next 18 inches is yellowish red cobbly clay loam mottled in shades of brown. The next 8 inches is red clay mottled in shades of brown. The lower part of the subsoil, to a depth of 46 inches, is mottled gray, brown, and yellowish red clay. The underlying material is very dark grayish brown shale tilted 30 degrees from horizontal.

The Denman soil is low in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer. The subsoil is strongly acid or very strongly acid. The underlying material is neutral to medium acid. Permeability is slow, and available water capacity is medium.

Included in mapping are areas of Panama, Carnasaw, and Clebit soils and outcrops of sandstone that make up about 20 percent of this association. Areas of included soils and outcrops of rock are 1 to 5 acres.

The soils in this association have low potential for row crops and small grain. Large stones on the surface, the severe erosion hazard, and the moderately steep slopes are limitations that are very difficult to overcome.

The soils are best suited to grass or woodland. They have medium potential for native grass and low potential for tame pasture. The steep slopes and stones on the surface are too numerous for preparation of a seedbed and the use of equipment. The quality and quantity of native grass can be maintained or improved by brush control, proper grazing, and fire prevention. Where it is practical to remove stones from the surface, the tame pasture grasses can be grown on the less sloping areas.

The soils in this association have low potential for woodland. Stones and moderately steep slopes are

limitations to management and equipment use. Seedling mortality is also a concern in woodland management. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

The soils in this association have low potential for most urban uses. The moderately steep slopes, high shrink-swell potential, and shallowness to rock are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, small commercial buildings, and dwellings.

This association is in capability subclass VIIs and the Sandy Savannah range site. The Bengal part is in woodland group 5x, and the Denman part is in woodland group 4x.

3—Bigfork-Yanush association, steep. This association consists of well drained, moderately deep Bigfork soils and well drained, deep Yanush soils that are in a regular and repeating pattern. The landscape is mainly rounded knobs or low ridges that are alined from east to west in the direction of the outcrops of chert and novaculite bedrock. Most areas have narrow, sharp, rounded ridges; steep, V-shaped side slopes; and narrow drains. The Bigfork soil is on ridges and the upper part of side slopes, and the Yanush soil is on the lower part of side slopes. The mapped areas are mostly long and parallel to the ridges and range from 20 to 400 acres. Areas of each soil range from 3 to 30 acres. Slopes are 20 to 45 percent.

The Bigfork soil makes up about 60 percent of each mapped area. Typically, the surface layer is dark grayish brown stony silt loam 7 inches thick. The subsurface layer, to a depth of 13 inches, is yellowish brown very cherty silt loam. The subsoil, to a depth of 28 inches, is strong brown very cherty clay loam. Hard chert that is tilted 30 degrees from horizontal is below the subsoil.

The Bigfork soil is low in natural fertility and organic matter content. It is slightly acid or medium acid in the surface layer, medium acid or strongly acid in the subsurface layer, and medium acid to very strongly acid in the subsoil. Permeability is moderate, and available water capacity is low.

The Yanush soil makes up 20 percent of each mapped area. Typically, the surface layer is very dark grayish brown stony loam 5 inches thick. The subsurface layer, to a depth of 12 inches, is yellowish brown stony loam. The upper part of the subsoil, to a depth of 24 inches, is reddish brown very cherty clay loam, and the lower part to a depth of 64 inches is yellowish red very cherty clay loam.

The Yanush soil is low in natural fertility and organic matter content. It is slightly acid or medium acid in the surface layer and strongly acid or very strongly acid in the subsurface layer and the subsoil. Permeability is moderate, and available water capacity is medium.

Included in mapping are areas of a soil that is similar to this Bigfork soil, except the depth to bedrock is less than 20 inches. This soil is commonly on the side slopes and ridgetops and makes up about 15 percent of mapped areas. Also included are rock outcrops that are mainly on ridgetops and make up 5 percent of mapped areas. These inclusions make up a total of about 20 percent of each mapped area.

The soils in this association have low potential for row crops and small grain. Large stones on the surface, the severe erosion hazard, and the steep slopes are limitations that are very difficult to overcome.

The soils are best suited to grass or woodland. They have medium potential for native grass and low potential for tame pasture. The steep slopes and numerous stones on the surface make it difficult to prepare a seedbed and use equipment. The quality and quantity of native grass can be maintained or improved by brush control, proper grazing, and fire prevention.

The soils in this association have low potential for woodland. Large stones and steep slopes are limitations to woodland management and equipment use. Seedling mortality is also a concern. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

The soils in this association have low potential for most urban uses. Depth to rock, steep slopes, and large stones are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This association is in capability subclass VIIs, woodland group 5x, and the Steep Chert Savannah range site.

4—Carnasaw-Clebit association, moderately steep. This association consists of well drained, deep Carnasaw soils and well drained, shallow Clebit soils that are in a regular and repeating pattern. The Carnasaw soil is on side slopes, and the Clebit soil is on ridgetops or benches of mountains. The mapped areas are mainly long and wide and range from 40 to 1,500 acres. Slopes are 8 to 30 percent.

The Carnasaw soil makes up 70 percent of each mapped area. Typically, the surface layer is very dark grayish brown stony fine sandy loam about 4 inches thick. The subsurface layer, to a depth of 9 inches, is yellowish brown stony fine sandy loam. The upper part of the subsoil, to a depth of 13 inches, is strong brown loam. The middle part, to a depth of 37 inches, is red and yellowish red mottled clay. The lower part of the subsoil, to a depth of 46 inches, is clay that is coarsely mottled in shades of red, brown, and gray. The underlying material is dark grayish brown shale that is tilted 40 degrees from horizontal.

The Carnasaw soil is low in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer and subsurface layer. The subsoil is

strongly acid or very strongly acid. Permeability is slow, and available water capacity is medium.

The Clebit soil makes up 15 percent of each area mapped. Typically, the surface layer is very dark grayish brown and brown stony fine sandy loam about 6 inches thick. The subsoil is yellowish brown stony loam to a depth of 12 inches. Hard sandstone that is tilted 40 degrees from horizontal is below the subsoil.

The Clebit soil is low in natural fertility and organic matter content. It is slightly acid to strongly acid in the surface layer and strongly acid or very strongly acid in the subsoil. Permeability is moderately rapid, and available water capacity is very low.

Included in mapping are small areas of Pirum, Octavia, and Panama soils and outcrops of sandstone. Pirum soil is on side slopes. Octavia and Panama soils are on foot slopes. The inclusions make up about 15 percent of mapped areas.

The soils in this association have low potential for row crops and small grain. Large stones on the surface, the severe erosion hazard, and moderately steep slopes are limitations that are very difficult to overcome.

The soils are best suited to grass or woodland. They have medium potential for native grass and low potential for tame pasture. The moderately steep slopes and stones on the surface are limitations for preparation of a seedbed and the use of equipment. The quality and quantity of native grass can be maintained or improved by brush control, proper grazing, and fire prevention.

The soils in this association have medium potential for woodland. Stones and moderately steep slopes are limitations to woodland management and equipment use. Seedling mortality is also a concern. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

The soils in this association have low potential for most urban uses. The moderately steep slopes, high shrink-swell potential, and shallowness to rock are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, small commercial buildings, and dwellings.

This association is in capability subclass VIIs. The Carnasaw part is in woodland group 4x and the Sandy Savannah range site. The Clebit part is in woodland group 5x and the Shallow Savannah range site.

5—Carnasaw-Clebit-Pickens Variant association, steep. This association consists of well drained, deep Carnasaw soils, well drained, shallow Clebit soils, and the somewhat excessively drained, shallow Pickens Variant. These soils are in a regular and repeating pattern on steep escarpments along side slopes of mountains. The Carnasaw soil, on side slopes, occurs below the thick layer of sandstone that forms a caprock at the top of the escarpment or slope. The Clebit soil occurs on ledges where thick beds of sandstone crop out. The Pickens Variant occurs on side slopes. Areas are long and narrow and are 50 to 500 acres. Slopes are 30 to 45 percent.

The Carnasaw soil makes up 55 percent of the association. Typically, the surface layer is dark grayish brown bouldery loam about 4 inches thick. The subsurface layer, to a depth of 9 inches, is yellowish brown bouldery loam. The upper part of the subsoil, to a depth of 14 inches, is strong brown clay loam. The middle part, to a depth of 24 inches, is red silty clay. The lower part of the subsoil, to a depth of 42 inches, is coarsely mottled silty clay. The underlying material is dark grayish brown shale tilted 60 degrees from horizontal.

The Carnasaw soil is low in natural fertility and organic matter content. It is medium acid to very strongly acid in the surface layer and subsurface layer. The subsoil is strongly acid or very strongly acid. Permeability is slow, and available water capacity is medium.

The Clebit soil makes up 15 percent of the association. Typically, the surface layer is brown bouldery fine sandy loam about 6 inches thick. The subsoil, to a depth of 10 inches, is yellowish brown bouldery fine sandy loam. The underlying material is hard sandstone tilted 60 degrees from horizontal.

The Clebit soil is low in natural fertility and organic matter content. It is slightly acid to strongly acid in the surface layer and strongly acid or very strongly acid in the subsoil. Permeability is moderately rapid, and available water capacity is very low.

The Pickens Variant makes up 15 percent of the association. Typically, the surface layer is dark grayish brown bouldery loam about 6 inches thick. The subsoil, to a depth of 19 inches, is yellowish brown very shaly loam. The underlying material is olive gray shale tilted 60 degrees from horizontal.

The Pickens Variant is low in natural fertility and organic matter content. It is slightly acid to strongly acid in the surface layer and medium acid to very strongly acid in the subsoil. Permeability is moderate, and available water capacity is very low.

Included in mapping are areas of Denman, Octavia, and Panama soils, commonly on foot slopes, and bands of rock outcrop at the top of the slope or escarpment. These inclusions make up about 15 percent of mapped areas.

The soils have low potential for row crops and small grain. Large stones on the surface, the severe erosion hazard, and steep slopes are limitations that are very difficult to overcome.

The soils are best suited to grass or woodland. They have medium potential for native grass and low potential for tame pasture. The steep slopes and numerous stones on the surface make it difficult to prepare a seedbed and use equipment. The quality and quantity of native grass can be maintained or improved by brush control, proper grazing, and fire prevention.

The soils in this association have low potential for woodland. Stones, shallowness to rock, and steep

slopes are limitations to woodland management and equipment use. Seedling mortality is also a concern. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

The soils have low potential for most urban uses. Steep slopes, large stones on the surface, high shrink-swell potential, slow permeability, and shallowness to rock are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, small commercial buildings, and dwellings.

This association is in capability subclass VIIs, woodland group 5x, and the Savannah Breaks range site.

6—Carnasaw-Clebit-Rock outcrop complex, 3 to 8 percent slopes. This complex consists of well drained, deep Carnasaw soils, well drained, shallow Clebit soils, and sandstone outcrops that are so intermingled that they could not be separated at the scale selected for mapping. These soils and Rock outcrop are on the rounded tops of the higher mountains. The Carnasaw soil is on side slopes, and the Clebit soil is on ridgetops. This complex is in long, narrow areas of 20 to 300 acres. Each soil is in areas of less than 5 acres.

The Carnasaw soil makes up 55 percent of each mapped area. Typically, the surface layer is dark brown stony loam about 4 inches thick. The subsurface layer is strong brown stony loam 5 inches thick. The upper part of the subsoil, to a depth of 18 inches, is yellowish red clay. The middle part, to a depth of 38 inches, is red, mottled clay. The lower part of the subsoil, to a depth of 45 inches, is clay that is coarsely mottled in shades of red, brown, and gray. The underlying material is dark grayish brown shale that is tilted 40 degrees from horizontal.

The Carnasaw soil is low in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer and subsurface layer. The subsoil is strongly acid or very strongly acid. Permeability is slow, and available water capacity is medium.

The Clebit soil makes up 25 percent of each mapped area. Typically, the surface layer is dark brown stony fine sandy loam about 4 inches thick. The subsoil, to a depth of 15 inches, is strong brown stony loam. Hard sandstone that is tilted 40 degrees from horizontal is below the subsoil.

The Clebit soil is low in natural fertility and organic matter content. It is slightly acid to strongly acid in the surface layer and strongly acid or very strongly acid in the subsoil. Permeability is moderately rapid, and available water capacity is very low.

Rock outcrop makes up 10 percent of each mapped area. It is hard sandstone that is tilted 40 degrees from horizontal.

Included in mapping are areas of less than 5 acres of Bengal and Pirum soils. The Bengal and Pirum soils are on side slopes. The included soils make up about 10 percent of this complex.

The soils in this complex have low potential for row crops and small grain. Large stones on the surface, rock outcrops, and shallowness to bedrock are limitations that are very difficult to overcome.

The soils are best suited to grass or woodland. They have medium potential for native grass and low potential for tame pasture. The stones on the surface are too numerous for preparation of a seedbed and the use of equipment. The quality and quantity of native grass can be maintained or improved by brush control, proper grazing, and fire prevention.

The soils in this complex have medium potential for woodland. The use of equipment is restricted because of large stones. Seedling mortality is also a concern. The quality and quantity of wood products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

The soils in this complex have low potential for most urban uses. Shallowness to rock, rock outcrops, and high shrink-swell potential are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, small commercial buildings, and dwellings.

This complex is in capability subclass VIIs. The Carnasaw part is in woodland group 4x and the Sandy Savannah range site. The Clebit part is in woodland group 5x and the Shallow Savannah range site.

7—Carnasaw-Pirum complex, 3 to 8 percent slopes. This complex consists of well drained, deep Carnasaw soils and well drained, moderately deep Pirum soils. These soils are so intermingled that they could not be separated at the scale selected for mapping. They are on upland ridges within broad valleys. The Carnasaw soil is on side slopes, and the Pirum soil is on ridges. Areas are oblong and range from 10 to 100 acres. Each soil is in areas of less than 10 acres.

The Carnasaw soil makes up about 50 percent of each mapped area. Typically, the surface layer is brown loam about 5 inches thick. The subsoil to a depth of 12 inches is yellowish brown clay loam. From 12 to 20 inches, the subsoil is reddish yellow clay; and from 20 to 32 inches, it is yellowish red mottled clay. The lower part of the subsoil, to a depth of 45 inches, is clay that is coarsely mottled in shades of red, yellow, brown, and gray. The underlying material is olive brown shale that is tilted 30 degrees from horizontal.

The Carnasaw soil is low in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer and strongly acid or very strongly acid in the subsoil. Permeability is slow, and available water capacity is medium. The root zone is deep, but the clayey subsoil slightly restricts root penetration.

The Pirum soil makes up 30 percent of each mapped area. Typically, the surface layer, to a depth of 7 inches,

is brown fine sandy loam. The subsurface layer, to a depth of 13 inches, is brown fine sandy loam. The upper part of the subsoil, to a depth of 24 inches, is reddish brown clay loam. The lower part, to a depth of 32 inches, is yellowish red mottled clay loam. Hard sandstone that is tilted 30 degrees from horizontal is below the subsoil.

The Pirum soil is low in natural fertility and organic matter content. The surface layer is medium acid or strongly acid, and the subsoil is strongly acid or very strongly acid. Permeability is moderate, and available water capacity is low. The root zone is moderately deep and is easily penetrated by roots.

Included in mapping are areas of Clebit and Denman soils. The Clebit soil is on ridgetops, and the Denman soil is on side slopes. Also included are areas of a soil that is similar to the Pirum soils, except the lower subsoil is more clayey and the underlying material is shale. These included soils make up about 20 percent of mapped areas. Areas of each soil are less than 5 acres.

The soils in this complex have medium potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is severe where cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

The soils in this complex have medium potential for native grass and for tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using suitable grazing practices and by preventing fire damage.

The soils in this complex have medium potential for woodland and have no significant limitations for woodland use and management. Stands can be maintained or improved by protecting them from fire, planting suitable species, removing or controlling inferior species, and selectively harvesting the trees on a schedule.

The soils in this complex have medium potential for most urban uses. The depth to rock, high shrink-swell potential, and slow permeability are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This complex is in capability subclass IVe, woodland group 4o, and the Sandy Savannah range site.

8—Carnasaw-Pirum-Clebit association, strongly sloping. This association consists of well drained, deep Carnasaw soils, well drained, moderately deep Pirum soils, and well drained, shallow Clebit soils. These soils are in a regular and repeating pattern. They are mapped on the higher mountains. The Carnasaw soil is on lower side slopes, and the Pirum soil is on upper side slopes. The Clebit soil is on ridge crests. Areas are mostly oblong with the long axis parallel to the strike of the underlying formations. They are 40 to 600 acres. Areas of each soil range from 3 to 30 acres. Slopes are 3 to 12 percent.

The Carnasaw soil makes up 65 percent of the association. Typically, the surface layer is dark grayish brown stony loam about 4 inches thick. The subsurface layer is brown stony loam about 4 inches thick. The upper part of the subsoil, to a depth of 24 inches, is red silty clay. The middle part, to a depth of 36 inches, is coarsely mottled silty clay. The lower part of the subsoil, to a depth of 50 inches, is coarsely mottled clay. The underlying material is olive shale that is tilted 25 degrees from horizontal.

The Carnasaw soil is low in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer and subsurface layer. The subsoil is strongly acid or very strongly acid. Permeability is slow, and available water capacity is medium.

The Pirum soil makes up about 15 percent of the association. Typically, the surface layer is dark grayish brown stony fine sandy loam about 9 inches thick. The subsurface layer, to a depth of 14 inches, is brown stony fine sandy loam. The upper part of the subsoil, to a depth of 28 inches, is yellowish red sandy clay loam. The lower part, to a depth of 34 inches, is reddish brown sandy clay loam. Hard brownish sandstone that is tilted 25 degrees from horizontal is below the subsoil.

Pirum soil is low in natural fertility and organic matter content. The surface layer and subsurface layer are medium acid or strongly acid. The subsoil is strongly acid or very strongly acid. Permeability is moderate, and available water capacity is low.

The Clebit soil makes up 10 percent of the association. Typically, the surface layer is dark brown stony fine sandy loam about 3 inches thick. The subsurface layer, to a depth of 6 inches, is brown stony fine sandy loam. The subsoil, to a depth of 16 inches, is brown stony fine sandy loam. The underlying material is hard sandstone that is tilted 25 degrees from horizontal.

The Clebit soil is low in natural fertility and organic matter content. It is slightly acid to strongly acid in the surface layer and subsurface layer and is strongly acid or very strongly acid in the subsoil. Permeability is moderately rapid, and available water capacity is very low.

Included in mapping are a few areas of Ceda soils on narrow flood plains. Also included are a few areas of Denman, Octavia, and Panama soils on the lower part of more sloping areas and small areas of sandstone outcrops. The included soils and outcrops of sandstone make up about 10 percent of mapped areas.

The soils in this association have low potential for row crops and small grain. Large stones on the surface, the severe erosion hazard, and strong slopes are limitations that are very difficult to overcome.

The soils in this association are best suited to grass or woodland. They have medium potential for native grass

(fig. 2) and have low potential for tame pasture (fig. 3). The strong slopes and numerous stones on the surface make it difficult to prepare a seedbed and use equipment. The quality and quantity of native grass can be maintained or improved by brush control, proper grazing, and fire prevention.

The soils in this association have medium potential for woodland. Large stones are a limitation to woodland management and equipment use. Seedling mortality is also a concern. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

The soils in this association have low potential for most urban uses. Strong slopes, high shrink-swell potential, and shallowness to rock are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, small commercial buildings, and dwellings.

This association is in capability subclass VIIs. The Carnasaw and Pirum parts are in woodland group 4x and the Sandy Savannah range site. The Clebit part is in woodland group 5x and the Shallow Savannah range site.

9—Ceda cherty silt loam, occasionally flooded. This soil is deep, well drained, and nearly level to very gently sloping. It is on flood plains that drain the Potato Hills and are subject to occasional flooding. Areas are 5 to 60 acres. Slopes are 0 to 2 percent.

Typically, the surface layer, to a depth of 12 inches, is very dark grayish brown cherty silt loam. The underlying material to a depth of 62 inches is dark yellowish brown, dark brown, and yellowish brown very cherty clay loam.

This soil is medium in natural fertility and organic matter content. It is slightly acid to medium acid in all

Figure 2.—Beef cattle grazing native grass on an area of Carnasaw-Pirum-Clebit association, strongly sloping. The range site is Sandy Savannah. The woodland is mostly native shortleaf pine.

Figure 3.—Bermudagrass pasture in the foreground on an area of Carnasaw soil in the Carnasaw-Pirum-Clebit association, strongly sloping. The more stony and more sloping part in the background is in shortleaf pine.

layers. Permeability is rapid, and available water capacity is low. Tilth is fair, and the soil can be worked throughout a wide range of moisture conditions. The root zone is deep, but rock fragments restrict root penetration.

Included in mapping are small areas of a soil that is similar to the Ceda soil, except it is less than 35 percent fragments of chert. The included soil, commonly less than 3 acres, makes up about 15 percent of this map unit.

This soil has medium potential for row crops and small grain. The erosion hazard is moderate because of stream overflows. Good tilth can be maintained by returning crop residue to the soil. Minimum tillage and the use of cover crops help to maintain tilth and to reduce surface crusting.

This soil has medium potential for native grass and for tame pasture. Tall fescue, bermudagrass, and bahiagrass are the main plants used for tame pasture. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using suitable grazing practices and brush control and by protecting against damage by fire.

This soil has medium potential for woodland. Seedling mortality and plant competition are the main limitations for woodland management. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

Because of the risk of damaging floods, this unit does not have potential for building sites. Flooding is the main limitation for septic tank absorption fields, sewage lagoons, trench sanitary landfills, and roads and streets. It can be reduced only by major flood control measures.

This soil is in capability subclass IVs and woodland group 3f; it is not assigned to a range site.

10—Ceda cherty silt loam, frequently flooded. This soil is deep, well drained, and nearly level to very gently sloping. It is on flood plains that drain the Potato Hills and are subject to frequent flooding. The area is dissected by meandering stream channels and scour channels. Mapped areas are about 100 to 300 feet wide and 10 to 100 acres. Slopes are 0 to 2 percent.

Typically, the surface layer is very dark grayish brown cherty silt loam 10 inches thick. The underlying material to a depth of 60 inches is brown cherty clay loam and dark grayish brown very cherty silt loam.

This soil is medium in natural fertility and organic matter content. It is slightly acid or medium acid in the surface layer and medium acid in the underlying material. Permeability is rapid, and available water capacity is low.

Included in mapping are intermingled areas of soils that are similar, except they are less than 35 percent fragments of chert. Also included is the stream channel. Included areas make up about 20 percent of mapped areas, but areas of each soil are less than 3 acres.

This soil has low potential for row crops and small grain. The erosion hazard is severe and crop damage is severe because of frequent overflow.

This soil is best suited to grass or woodland. It has low potential, however, for native grass and for tame pasture. Low available water capacity and frequent flooding are the main limitations for grassland management.

This soil has medium potential for woodland. Seedling mortality and plant competition are the main limitations in woodland management. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

Because of the risk of damaging floods, this soil should not be considered as having potential for building sites. Flooding is the main limitation for septic tank absorption fields, sewage lagoons, trench sanitary landfills, and roads and streets. This limitation can be reduced only by major flood control measures.

This soil is in capability subclass VIIs and woodland group 3f; it is not assigned to a range site.

11—Ceda-Rubble land complex. This complex consists of well drained, deep, nearly level or very gently sloping Ceda soil and small areas of Rubble land that are so intermingled that they could not be separated at the scale selected for mapping. This complex is on narrow flood plains that are subject to frequent flooding. Mapped areas are long and narrow and are along local mountain streams. They are 10 to 60 acres. Slopes are 0 to 2 percent.

The Ceda soil makes up 65 percent of each mapped area. Typically, the surface layer is brown very gravelly fine sandy loam about 7 inches thick. The underlying material to a depth of 72 inches is stratified brown very gravelly fine sandy loam.

The Ceda soil is medium in natural fertility and organic matter content. It is slightly acid or medium acid in all layers. Permeability is rapid, and available water capacity is low. The root zone is deep, but coarse fragments restrict root penetration.

Rubble land makes up 20 percent of each mapped area. Typically, Rubble land is on the floor of stream channels and consists of boulders, stones, cobblestones, and gravel. A few small pockets of loamy soil material make up less than 10 percent of the volume.

Included in mapping are Dela soils, which make up 5 percent of a mapped area, and Kenn soils, which make up 10 percent. Dela and Kenn soils are on slightly higher parts of the flood plain. Areas of each included soil are less than 3 acres.

The soils in this complex have low potential for row crops and small grain. The erosion hazard is severe because of stream overflow.

These soils are best suited to grass or woodland. They have low potential, however, for native grass and for tame pasture. Low available water capacity and frequent flooding are the main limitations for grassland management.

The soils in this complex have medium potential for woodland. Seedling mortality and plant competition are the main limitations in woodland management. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

Because of the risk of damaging floods, the soils in this map unit do not have potential for building sites. Flooding, seepage, and content of small stones are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfill, and roads and streets. The flooding can be reduced only by major flood control measures.

This complex is in capability subclass VIIs; it is not assigned to a range site. The Ceda part is in woodland group 3f, and the Rubble land part is not assigned to a woodland group.

12—Clebit-Pirum complex, 5 to 12 percent slopes. This complex consists of well drained, shallow Clebit soils and well drained, moderately deep Pirum soils that are so intermingled that they could not be separated at the scale selected for mapping. This complex is on sloping or strongly sloping hilltops and side slopes of ridges in broad valleys. The Clebit soil is on ridgetops, and the Pirum soil is on side slopes. Areas of each soil are 2 to 10 acres.

The Clebit soil makes up 60 percent of each mapped area. Typically, the surface layer is brown very gravelly fine sandy loam about 5 inches thick. The subsoil, to a depth of 12 inches, is strong brown very gravelly fine sandy loam. Hard sandstone that is tilted 30 degrees from horizontal is below the subsoil.

The Clebit soil is low in natural fertility and organic matter content. The surface layer is slightly acid or medium acid, and the subsoil is strongly acid or very strongly acid. Permeability is moderately rapid, and available water capacity is very low.

The Pirum soil makes up 25 percent of each mapped area. Typically, the surface layer is dark brown fine

sandy loam about 5 inches thick. The subsurface layer, to a depth of 10 inches, is yellowish brown fine sandy loam. The upper part of the subsoil, to a depth of 22 inches, is yellowish red sandy clay loam. The lower part, to a depth of 26 inches, is strong brown loam. Hard sandstone bedrock that is tilted 30 degrees from horizontal is below the subsoil.

The Pirum soil is low in natural fertility and organic matter content. Reaction is strongly acid or very strongly acid in all layers. Permeability is moderate, and available water capacity is low.

Included in mapping are small areas of Carnasaw soils, on side slopes, and areas of a soil that is similar to the Clebit soil, except the subsoil contains less than 35 percent fragments of sandstone. Also included are small areas of sandstone outcrop. Included soils and rock outcrop make up 15 percent of this complex.

The soils have low potential for row crops and small grain. Steep slopes and shallowness to bedrock are limitations that are very difficult to overcome.

The soils are best suited to grass or woodland. They have low potential, however, for native grass and tame pasture. Bermudagrass and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by protecting against damage by fire.

The soils have low to medium potential for woodland. Seedling mortality is the main limitation in woodland use and management. The quality and quantity of wood products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

The soils in this complex have medium potential for most urban uses. Shallowness to rock is the main limitation for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This complex is in capability subclass VIe. The Clebit part is in woodland group 5d and the Shallow Savannah range site. The Pirum part is in woodland group 4o and the Sandy Savannah range site.

13—Clebit-Pirum-Rock outcrop complex, 15 to 40 percent slopes. This complex consists of well drained, shallow Clebit soils and well drained, moderately deep Pirum soils and sandstone outcrops. These soils and outcrops of rock are so intermingled that they could not be separated at the scale selected for mapping. The Clebit soil is on benches, and the Pirum soil is on side slopes. This complex is in long, narrow areas of 30 to 160 acres on steep side slopes or escarpments of the higher mountains. Areas of each soil are less than 5 acres.

The Clebit soil makes up about 35 percent of each mapped area. Typically, the surface layer is very dark grayish brown bouldery fine sandy loam about 5 inches thick. The subsoil, to a depth of 14 inches, is brown bouldery fine sandy loam. Hard sandstone that is tilted 40 degrees from horizontal underlies the subsoil.

The Clebit soil is low in natural fertility and organic matter content. It is slightly acid or medium acid in the surface layer and strongly acid or very strongly acid in the subsoil. Permeability is moderately rapid, and available water capacity is very low.

The Pirum soil makes up about 30 percent of each mapped area. Typically, the surface layer is brown bouldery fine sandy loam about 8 inches thick. The subsurface layer, to a depth of 12 inches, is yellowish brown bouldery fine sandy loam. The upper part of the subsoil, to a depth of 23 inches, is yellowish red sandy clay loam. The lower part, to a depth of 36 inches, is yellowish red and pale brown gravelly sandy clay loam. Hard sandstone that is tilted 40 degrees from horizontal is below the subsoil.

The Pirum soil is low in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer. The subsurface layer and subsoil are strongly acid or very strongly acid. Permeability is moderate, and available water capacity is low.

Sandstone outcrop makes up about 20 percent of each mapped area. These areas are bare sandstone or only a few inches of fine sandy loam over hard sandstone.

Included in mapping are small areas of Carnasaw soils and Denman soils and areas of soils that are similar to Pirum soils, except the subsoil is more than 35 percent sandstone fragments. Carnasaw and Denman soils are on side slopes. The included soils make up about 15 percent of this complex. Areas of each included soil are commonly less than 3 acres.

These soils have low potential for row crops and small grain. Steep slopes, large stones on the surface, rock outcrops, and the severe erosion hazard are limitations that are very difficult to overcome.

The soils are best suited to grass or woodland. They have low potential, however, for native grass and for tame pasture. The steep slopes, rock outcrops, and numerous stones on the surface make it difficult to prepare a seedbed and use equipment. The quality and quantity of native grass can be maintained or improved by brush control, proper grazing, and fire prevention.

This complex has low potential for woodland. Rock outcrops, stones, shallowness to rock, and steep slopes are limitations in woodland management and equipment use. Seedling mortality is also a concern. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

This complex has low potential for most urban uses. Steep slopes, rock outcrops, large stones on the surface, and shallowness to rock are the main limitations for septic tank absorption fields, sewage lagoons, trench

sanitary landfills, local roads and streets, small commercial buildings, and dwellings.

This complex is in capability subclass VIIs. The Clebit part is in woodland group 5x and the Shallow Savannah range site. The Pirum part is in woodland group 4x and the Sandy Savannah range site.

14—Clodine Variant-Wilburton Variant complex, 0 to 3 percent slopes. This complex consists of the deep, poorly drained Clodine Variant and deep, well drained Wilburton Variant soils that are so intermingled that they could not be separated at the scale selected for mapping. The Clodine Variant soil is in concave areas between mounds, and the Wilburton Variant soil is on the mounds. This complex is in long, narrow areas of 20 to 50 acres that are parallel to drainageways from the Potato Hills. Areas of each soil are less than 3 acres.

The Clodine Variant makes up about 45 percent of each area mapped. Typically, the surface layer is grayish brown cherty silt loam about 6 inches thick. The subsurface layer, to a depth of 14 inches, is light brownish gray cherty silt loam. The upper part of the subsoil, to a depth of 32 inches, is dark gray very cherty silty clay loam. The middle part, to a depth of 44 inches; is dark grayish brown, mottled very cherty silty clay loam. The lower part of the subsoil to a depth of 65 inches is mottled dark gray, pale brown, and yellowish brown very cherty clay loam.

The Clodine Variant is low in natural fertility and organic matter content. It is slightly acid to strongly acid in the surface layer. The subsurface layer and the upper and middle parts of the subsoil are medium acid to very strongly acid. The lower part is slightly acid to strongly acid. Permeability is moderate, and available water capacity is medium. A water table is at a depth of 1/2 foot to 1 1/2 feet during winter and spring. The root zone is deep, but root penetration is moderately restricted because of chert fragments.

The Wilburton Variant makes up 35 percent of each area mapped. Typically, the surface layer is brown cherty loam about 12 inches thick. The upper part of the subsoil, to a depth of 26 inches, is dark yellowish brown cherty loam. The middle part, to a depth of 46 inches, is yellowish brown cherty clay loam. The lower part of the subsoil to a depth of 65 inches is brown, mottled cherty loam.

The Wilburton Variant is low in natural fertility and organic matter content. It is slightly acid to strongly acid in the surface layer and medium acid to very strongly acid in the subsoil. Permeability is moderate, and available water capacity is medium. The root zone is deep and is easily penetrated by roots.

Included in mapping are small areas of Ceda soils along drains. Also included are areas of a soil that is similar to the Clodine Variant soil, except it has a less gray subsoil and is better drained. These soils are between the concave, low areas and the mounds. Included soils make up about 20 percent of each mapped area.

The soils in this complex have medium potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate where cultivated crops are grown. Minimum tillage, the use of cover crops, and contour farming help to reduce runoff and to control erosion.

The soils in this complex have medium potential for native grass and for tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by protecting against damage by fire.

The soils in this complex have medium potential for woodland. Wetness, seedling mortality, and equipment limitations are the main concerns in woodland use and management. Stands can be maintained or improved by protecting them from fire, planting improved seedlings, removing or controlling cull trees, selectively harvesting trees on a schedule, and preventing overgrazing.

The soils in this complex have low potential for most urban uses. In areas of the Clodine Variant soils, wetness is the main limitation for septic tank absorption fields, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings. In areas of the Wilburton Variant soils, shrink-swell potential is the main limitation.

This complex is in capability subclass IVw; it is not assigned to a range site. The Clodine part is in woodland group 3w, and the Wilburton part is in woodland suitability group 3o.

15—Counts silt loam, 0 to 1 percent slopes. This soil is deep, moderately well drained, and nearly level. It is in concave areas in broad valleys. Slopes are smooth and slightly concave. Areas are long and wide and are 20 to 200 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The upper part of the subsoil, to a depth of 17 inches, is mottled, dark yellowish brown clay. The middle part of the subsoil, to a depth of 42 inches, is mottled, yellowish brown clay. The lower part of the subsoil to a depth of 72 inches is coarsely mottled gray and yellowish brown clay.

This Counts soil is medium in natural fertility and organic matter content. It is medium acid to very strongly acid in the surface layer and medium acid to moderately alkaline in the subsoil. Permeability is very slow, and available water capacity is high. A water table is at a depth of 1 to 2 feet during winter and spring. Tilth is fair, and the soil can be worked throughout a medium range of moisture conditions. The root zone is deep, but root penetration is moderately restricted because of the clay subsoil.

Included in mapping are small areas of Stigler, Wister, and Wing soils. Also included are a few areas of a soil

that is similar to the Counts soil but has no gray mottles in the upper part of the subsoil. Stigler, Wister, and Wing soils are in similar positions on the landscape as the Counts soil. Also included are deep soils, on mounds, that have a thicker surface layer and less clay in the upper part of the subsoil than the Counts soil. Typically, the uncultivated mounds are circular areas that are 20 feet in diameter and 2 feet higher than the adjacent Counts soil. In cultivated areas the mounds are difficult to observe because they have been plowed down. The included soils make up about 20 percent of this map unit, but individual areas are generally less than 5 acres.

This soil has high potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is slight where cultivated crops are grown. Minimum tillage, the use of cover crops, and contour farming help to reduce runoff and to control erosion.

This soil has high potential for native grass and for tame pasture. Bermudagrass, tall fescue, and bahiagrass are the most common plants used for tame pasture. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by protecting against damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Stands can be maintained or improved by protecting them from wildfire, planting improved seedlings, removing or controlling cull trees, selectively harvesting trees on a schedule, and preventing overgrazing.

This soil has low potential for most urban uses. The high shrink-swell potential and wetness are the main limitations for septic tank absorption fields, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IIw, woodland group 4o, and the Loamy Savannah range site.

16—Counts silt loam, 1 to 3 percent slopes. This soil is deep, moderately well drained, and very gently sloping. It is in convex areas in broad valleys. Slopes are smooth and slightly convex. Areas are 20 to 200 acres.

Typically, the surface layer is dark grayish brown silt loam 8 inches thick. The subsurface layer is grayish brown silt loam 5 inches thick. The upper part of the subsoil, to a depth of 46 inches, is yellowish brown, mottled clay. The lower part of the subsoil to a depth of 65 inches is coarsely mottled gray, brown, and yellow clay.

This Counts soil is medium in natural fertility and organic matter content. It is medium acid to very strongly acid in the surface and subsurface layers and in the upper part of the subsoil. The lower part of the subsoil is medium acid to moderately alkaline. Permeability is very slow, and available water capacity is high. A water table is at a depth of 1 to 2 feet during winter and spring. Tilth is fair, and the soil can be worked throughout a medium range of moisture conditions. The root zone is deep, but root penetration is moderately restricted because of the clay subsoil.

Included in mapping are small areas of Stigler and Wister soils and a soil that is similar to this Counts soil, except that grayish mottles are below a depth of 30 inches. Stigler soils are in higher areas, and Wister soils are in similar areas of the landscape. Also included are deep soils, on mounds, where the surface and subsurface layers are thicker and the upper part of the subsoil is less clayey than in this Counts soil. In uncultivated areas the mounds typically are circular areas 20 feet in diameter and 2 feet higher than the Counts soil. In cultivated areas the mounds are difficult to observe because they have been plowed down. Included soils make up 30 percent of each area mapped, but areas of each soil are generally less than 5 acres.

This soil has high potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate where cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has high potential for native grass and for tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by protecting against damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Stands can be maintained or improved by protecting them from wildfire, planting improved seedlings, removing or controlling cull trees, selectively harvesting trees on a schedule, and preventing overgrazing.

This soil has low potential for most urban uses. The high shrink-swell potential and wetness are the main limitations for septic tank absorption fields, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IIIe, woodland group 4o, and the Loamy Savannah range site.

17—Counts-Rexor complex, 0 to 12 percent slopes. This complex consists of areas of deep, moderately well drained Counts soils and Rexor soils that are so intermingled that they could not be separated at the scale selected for mapping. These soils are along drainageways within broad valleys. The sloping to strongly sloping Counts soil is on side slopes. The nearly level or very gently sloping Rexor soil is on flood plains. Areas are long and narrow and about 100 to 400 feet wide. Areas of each soil are 10 to 100 acres.

The Counts soil makes up about 35 percent of each mapped area. Typically, the surface layer is dark brown silt loam 8 inches thick. The subsurface layer, to a depth of 15 inches, is brown silt loam. The upper part of the subsoil, to a depth of 52 inches, is yellowish brown, mottled silty clay. The lower part of the subsoil to a depth of 65 inches is dark yellowish brown, mottled silty clay.

The Counts soil is medium in natural fertility and organic matter content. It is medium acid to very strongly acid in the surface and subsurface layers. The upper part of the subsoil is medium acid to very strongly acid. The lower part of the subsoil is medium acid to moderately alkaline, permeability is very slow, and available water capacity is high. A water table is at a depth of 1 to 2 feet during winter and spring.

The Rexor soil makes up 20 percent of each mapped area. Typically, the surface layer is dark brown loam 8 inches thick. The subsoil to a depth of 41 inches is yellowish brown clay loam, and below that, to a depth of 60 inches, is brown loam.

The Rexor soil is medium in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer and subsoil. Permeability is moderate, and available water capacity is high. A water table is at a depth of 3 to 5 feet during winter and spring. This soil is subject to frequent flooding.

Included in mapping are areas of the Stigler, Tamaha, Sobol, and Wister soils on uplands and the Dela and Neff soils on flood plains. The included soils make up about 45 percent of this complex, but individual areas are less than 3 acres.

The soils in this complex have low potential for row crops and small grain. The frequent flooding and the severe erosion hazard are the main limitations.

The soils are best suited to grass or woodland. They have high potential for native grass and medium potential for tame pasture. Tall fescue, bermudagrass, and bahiagrass are the main plants used for tame pasture. Fertilizing tame pasture grasses improves the quality of the grass, increases forage production, and protects the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by protecting against damage by fire.

The soils in this complex have medium potential for woodland. The main concern is plant competition. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

The soils in this complex have low potential for most urban uses. Frequent flooding, wetness, and high shrink-swell potential are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This complex is in capability subclass VIe. The Counts part is in woodland group 4o and the Loamy Savannah range site. The Rexor part is in woodland group 2o and is not assigned to a range site.

18—Counts-Wing complex, 1 to 3 percent slopes. This complex consists of areas of deep, moderately well drained Counts and Wing soils that are so intermingled that they could not be separated at the scale used for mapping. The very gently sloping Counts soil is on convex uplands. The very gently sloping Wing soil is on concave uplands. This complex is in long, narrow areas of 10 to 150 acres.

The Counts soil makes up about 55 percent of each mapped area. Typically, the surface layer, to a depth of 8 inches, is dark grayish brown silt loam. The subsurface layer, to a depth of 13 inches, is grayish brown silt loam. The upper part of the subsoil, to a depth of 23 inches, is dark yellowish brown clay. The middle part, to a depth of 51 inches, is yellowish brown, mottled clay. The lower part of the subsoil to a depth of 72 inches is coarsely mottled clay.

The Counts soil is medium in natural fertility and organic matter content. It is medium acid to very strongly acid in the surface and subsurface layers. The upper and middle parts of the subsoil are medium acid to very strongly acid, and the lower part is medium acid to moderately alkaline. Permeability is very slow, and available water capacity is high. A water table is at a depth of 1 to 2 feet during winter and spring. Tilth is poor, and the soil can be worked within only a narrow range of moisture conditions. The root zone is deep, but root penetration is moderately restricted by the clayey subsoil.

The Wing soil makes up 25 percent of each mapped area. Typically, the surface layer, to a depth of 6 inches, is brown silt loam. The upper part of the subsoil, to a depth of 24 inches, is dark yellowish brown silty clay. The middle part, to a depth of 52 inches, is yellowish brown, mottled silty clay. The lower part of the subsoil to a depth of 72 inches is coarsely mottled clay.

The Wing soil is medium in natural fertility and low in organic matter content. The surface layer is slightly acid or medium acid. The upper part of the subsoil is neutral to moderately alkaline, and the lower part is moderately alkaline. Permeability is very slow, and available water capacity is low. A water table is at a depth of less than 1 foot during winter and spring. Tilth is poor, and the soil can be worked within only a narrow range of moisture conditions. It has a deep root zone, but root penetration is restricted because of the high sodium content and the clayey subsoil.

Included in mapping are areas of Stigler, Tamaha, and Wister soils. The included soils and Counts soil are in similar positions on the landscape. Included soils make up about 20 percent of this complex, but individual areas are less than 3 acres.

The soils in this complex have medium potential for row crops and small grain. Wetness, the high content of sodium, and the moderate erosion hazard are the main

limitations. Good tilth can be maintained by returning crop residue to the soil. Minimum tillage, the use of cover crops, and contour farming help to reduce runoff and to control erosion.

The soils in this complex have medium potential for native grass and medium potential for tame pasture. Tall fescue, bermudagrass, and bahiagrass are the main plants used for tame pasture. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing fire damage.

The soils in this complex have low potential for woodland. Planting trees for commercial woodland is not recommended on the Wing soil. The main concern is plant competition. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

The soils in this complex have low potential for most urban uses. Wetness and high shrink-swell potential are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This complex is in capability subclass IVs. The Counts part is in woodland group 4o and the Loamy Savannah range site. The Wing part is not assigned to a woodland group and is in the Slickspot range site.

19—Cupco silt loam. This soil is deep, somewhat poorly drained, and nearly level. It is on flood plains of major streams. The smooth to slightly concave slopes range from 0 to 1 percent. Areas are 5 to 300 acres. The soil is occasionally flooded.

Typically, the surface layer is dark grayish brown and brown silt loam about 14 inches thick. The subsurface layer is gray silt loam about 6 inches thick. The subsoil is mottled silty clay loam that is dark grayish brown to a depth of 35 inches and brown to a depth of 80 inches.

This Cupco soil is medium in natural fertility and organic matter content. It is slightly acid to very strongly acid in the surface layer, except in areas that have been limed. The subsurface layer is strongly acid or very strongly acid. The upper part of the subsoil is slightly acid to very strongly acid, and the lower part is neutral to strongly acid. Permeability is moderately slow, and available water capacity is high. A water table is at a depth of 1/2 foot to 2 feet during winter and spring. Tilth is fair, and the soil can be worked throughout a medium range of moisture conditions. The root zone is deep and easily penetrated by roots.

Included in mapping are areas of Neff and Rexor soils. Rexor soils are adjacent to stream channels, and Neff soils are in better drained areas of the flood plain. Included soils make up 15 percent of this unit, but separate areas are generally less than 5 acres.

This soil has high potential for row crops and small grain. The erosion hazard is slight to moderate because of stream overflow. Good tilth can be maintained by returning crop residue to the soil. Minimum tillage and the use of cover crops help to maintain tilth and to reduce surface crusting.

This soil has high potential for native grass and for tame pasture. Tall fescue, bermudagrass, and bahiagrass are the main plants used for tame pasture. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. Wetness restricts the use of equipment. Seedling mortality is also a concern in woodland management. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

Because of the risk of damaging floods, this soil should not be considered for building sites. Flooding and wetness are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings. These limitations can be reduced only by major flood control measures and drainage.

This soil is in capability subclass IIIw and woodland group 3w. It is not assigned to a range site.

20—Dela fine sandy loam. This soil is deep, moderately well drained, and nearly level or very gently sloping. It is on flood plains of local streams and is subject to occasional flooding. Areas are long and narrow and 5 to 60 acres. Slopes are smooth to slightly convex and range from 0 to 2 percent.

Typically, the surface layer is brown fine sandy loam about 12 inches thick. The underlying material is brown fine sandy loam to a depth of about 36 inches. From 36 to 48 inches, it is brown fine sandy loam with thin strata of reddish brown sandy clay loam. From 48 to 60 inches, it is dark yellowish brown fine sandy loam with thin strata of brown loam. The lower part of the underlying material to a depth of 72 inches is yellowish brown fine sandy loam with brown mottles and thin strata of brown loam.

This soil is medium in natural fertility and low in organic matter content. It is slightly acid to strongly acid in all layers. Permeability is moderately rapid, and available water capacity is high. A water table is at a depth of 3 to 5 feet during winter and spring. Tilth is good, and the soil can be worked throughout a wide range of moisture conditions. The root zone is deep and easily penetrated by roots.

Included in mapping are small areas of Ceda, Rexor, Kenn, and Neff soils. The Ceda and Kenn soils are on the flood plain but are nearer to the stream channel. The Rexor and Neff soils generally occur farther downstream

than Dela soils. In areas where they occur in the same landscape as Dela soils, near the uplands, they are in slightly lower areas of the flood plain. The included soils make up about 20 percent of this map unit, but separate areas are less than 3 acres.

This soil has high potential for row crops and small grain. The erosion hazard is slight to moderate because of stream overflow. Good tilth can be maintained by returning crop residue to the soil. Minimum tillage and the use of cover crops help to maintain tilth and to reduce surface crusting.

This soil has high potential for native grass and tame pasture. Tall fescue, bermudagrass, and bahiagrass are the main plants used for tame pasture. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has high potential for woodland. It has no significant limitations for woodland management. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

Because of the risk of damaging floods, this unit should not be considered as having potential for building sites. Flooding is the main limitation for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings. Only major flood control measures help to reduce flooding.

This soil is in capability subclass IIw and woodland group 2o. It is not assigned to a range site.

21—Denman-Carnasaw association, steep. This association consists of deep, well drained Denman and Carnasaw soils that are in a regular and repeating pattern, mainly on the northern side of steep hills or mountains. The Denman soil in most areas is on the lower part of side slopes, where the colluvial mantle is thicker, but it also occurs on upper slopes. The Carnasaw soil in most areas is on the upper part of side slopes, where the colluvial mantle is thinner, but it also occurs on lower slopes. Mapped areas are mostly long and narrow and range from 40 to 600 acres. Areas of each soil range from 2 to 20 acres. Slopes are 8 to 30 percent.

The Denman soil makes up about 55 percent of each mapped area. Typically, the surface layer is dark brown stony loam about 6 inches thick. The subsoil to a depth of 10 inches is brown cobbly loam. From 10 to 22 inches, the subsoil is strong brown gravelly clay loam. From 22 to 46 inches, it is yellowish red, mottled silty clay. The lower part of the subsoil, to a depth of 56 inches, is olive gray, mottled silty clay. The underlying material is dark gray and olive gray shale tilted 30 degrees from horizontal.

The Denman soil is low in natural fertility and organic matter content. It is medium acid or very strongly acid in the surface layer and in the upper and middle parts of the subsoil. The lower part of the subsoil is strongly acid or very strongly acid. The underlying material is neutral to medium acid. Permeability is slow, and available water capacity is medium.

The Carnasaw soil makes up about 30 percent of each mapped area. Typically, the surface layer is dark brown stony loam about 5 inches thick. The subsurface layer is brown loam 5 inches thick. The upper part of the subsoil, to a depth of 24 inches, is yellowish red clay. The middle part, to a depth of 40 inches, is yellowish red, mottled clay. The lower part of the subsoil, to a depth of 56 inches, is coarsely mottled reddish, brownish, and gray clay. Olive gray shale that is tilted 30 degrees from horizontal is below the subsoil.

The Carnasaw soil is low in natural fertility and organic matter content. It is medium acid or strongly acid in the surface and subsurface layers. The subsoil is strongly acid or very strongly acid. Permeability is slow, and available water capacity is medium.

Included in mapping are areas of Clebit, Panama, and Octavia soils and a few sandstone outcrops. The Clebit soils occur on ridge crests. The Panama and Octavia soils are on side slopes and foot slopes. The included soils and sandstone outcrops make up about 15 percent of the association. Areas of each included soil are less than 5 acres.

The soils in this association have low potential for row crops and small grain. Large stones on the surface, the severe erosion hazard, and steep slopes are limitations that are very difficult to overcome.

The soils are best suited to grass or woodland. They have medium potential for native grass and low potential for tame pasture. The steep slopes and numerous stones on the surface make it difficult to prepare a seedbed and use equipment. The quality and quantity of native grass can be maintained or improved by brush control, proper grazing, and fire prevention.

The soils in this association have medium potential for woodland. Stones and steep slopes are limitations in woodland management and equipment use. Seedling mortality is also a concern in woodland management. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

The soils in this association have low potential for most urban uses. Steep slopes and high shrink-swell potential are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, small commercial buildings, and dwellings.

This association is in capability subclass VIIs, woodland group 4x, and the Sandy Savannah range site.

22—Freestone Variant-Bernow Variant complex, 0 to 2 percent slopes. This complex consists of the deep,

somewhat poorly drained Freestone Variant and deep, moderately well drained Bernow Variant soils. These soils are so intermingled that they could not be separated at the scale selected for mapping. They are in broad valleys on alluvial fans of uplands adjacent to the mountains in the southern part of the county. The Freestone Variant soil is in concave areas between mounds, and the Bernow Variant soil is on circular mounds that are typically about 2 feet higher than the Freestone Variant soil. The soils are in long, wide areas of 5 to 200 acres.

The Freestone Variant makes up 50 percent of each mapped area. Typically, the surface layer is brown fine sandy loam about 9 inches thick. The upper part of the subsoil, to a depth of 18 inches, is yellowish brown sandy clay loam. The middle part of the subsoil, to a depth of 46 inches, is coarsely mottled grayish brown, yellowish brown, and yellowish red clay loam. The lower part of the subsoil to a depth of 72 inches is coarsely mottled gray, brown, and light yellowish brown clay loam.

The Freestone Variant is medium in natural fertility and low in organic matter content. It is medium acid to very strongly acid in all layers. Permeability is moderately slow, and available water capacity is high. A water table is at a depth of 1.5 to 2 feet during winter and spring. Tilth is good, and the soil can be worked throughout a wide range of moisture conditions. The root zone is deep, but root penetration is slightly restricted because of the firm subsoil.

The Bernow Variant soil makes up 35 percent of each mapped area. Typically, the surface layer is dark brown fine sandy loam about 10 inches thick. The subsurface layer is light yellowish brown fine sandy loam about 7 inches thick. The subsoil to a depth of 36 inches is yellowish brown clay loam, and from 36 to 48 inches, it is yellowish brown mottled clay loam. The lower part of the subsoil to a depth of 72 inches is coarsely mottled gray and brown sandy clay loam.

The Bernow Variant soil is medium in natural fertility and low in organic matter content. The surface layer is slightly acid to very strongly acid. The subsurface layer and subsoil are medium acid to very strongly acid. Permeability is moderately slow, and available water capacity is high. A water table is at a depth of 3 to 4 feet during winter and spring. This soil has good tilth, and it can be worked throughout a wide range of moisture conditions. The root zone is deep and easily penetrated by roots.

Included in mapping are small areas of Stigler, Wister, Dela, and Neff soils. Dela and Neff soils are on narrow flood plains. Stigler soils are on sides of the mounds, and Wister soils are in concave areas. Also included are soils that have numerous gravel fragments in the subsoil but are otherwise similar to the Freestone Variant soils. Included soils make up 15 percent of this complex, but areas of each soil are less than 3 acres.

The soils have high potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is slight where cultivated crops are grown. Minimum tillage, the use of cover crops, and contour farming help to reduce runoff and control erosion.

The soils in this complex have high potential for native grass and medium potential for tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

The soils in this complex have medium potential for woodland. Seedling mortality is the only significant limitation in woodland use and management. Stands can be maintained or improved by preventing damage by wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

The soils in this complex have low potential for most urban uses. Wetness is the main limitation for septic tank absorption fields, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This complex is in capability subclass IIw; it is not assigned to a range site. The Freestone Variant part is in woodland group 3w, and the Bernow Variant part is in woodland group 3o.

23—Kanima shaly silty clay loam, 30 to 50 percent slopes. This deep, well drained, moderately permeable soil is on spoil banks of shaly material displaced during strip mine operations. Individual areas are 5 to 60 acres.

Typically, the surface layer is dark grayish brown shaly silty clay loam about 8 inches thick. The underlying material to a depth of 72 inches is dark grayish brown shaly silty clay loam.

The Kanima soil is low in natural fertility and organic matter content. It is medium acid to moderately alkaline in all layers. Permeability is moderate, and available water capacity is low. Tilth is poor. The root zone is deep, but root penetration is restricted because of the high percentage of shale fragments.

Included in mapping are small areas of Stigler, Counts, Sobol, and Tamaha soils. Pits are 15 percent of each mapped area, and the included soils are about 20 percent, but separate areas of these inclusions are less than 3 acres in size.

This soil has low potential for row crops and small grain. The severe erosion hazard and steep slopes are limitations that are very difficult to overcome.

The soil is best suited to grass or woodland. It has low potential, however, for native grass and for tame pasture. The low available water capacity, steep slopes, and small stones on the surface are the main limitations for management of grasses. The quality and quantity of native grass can be maintained or improved by brush control, proper grazing, and fire prevention. Where slope

can be reduced by leveling, the tame pasture potential can be improved.

This soil has low potential for woodland. Steep slopes, low available water capacity, and low natural fertility are the main limitations in woodland management.

This soil has low potential for most urban uses. Steep slopes, unstable fill, and small stones are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass VIIs; it is not assigned to a woodland group or a range site.

24—Kenn-Ceda complex, 0 to 2 percent slopes. This complex consists of areas of deep, well drained Kenn and Ceda soils that are so intermingled that they could not be separated at the scale selected for mapping. These nearly level to very gently sloping soils are on flood plains that drain the mountains. The areas are subject to occasional flooding. They are long and narrow and range from 10 to 200 acres. Areas of each soil are 1/2 acre to 5 acres.

The Kenn soil makes up about 60 percent of each mapped area. Typically, the surface layer is dark brown loam about 9 inches thick. The upper part of the subsoil, to a depth of 34 inches, is yellowish red gravelly sandy clay loam. The lower part, to a depth of 43 inches, is brown very gravelly sandy clay loam. The underlying material to a depth of 60 inches is brown very gravelly loam.

The Kenn soil is medium in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer and strongly acid or very strongly acid in the subsoil. Permeability is moderate, and available water capacity is medium.

The Ceda soil makes up about 25 percent of each mapped area. Typically, the surface layer is brown gravelly loam about 6 inches thick. The underlying material to a depth of 17 inches is brown very gravelly loam, and below that, to a depth of 60 inches, it is yellowish brown cobbly loam.

The Ceda soil is medium in natural fertility and organic-matter content. It is slightly acid or medium acid in all layers. Permeability is rapid, and available water capacity is low.

Included in mapping are small areas of Rexor and Neff soils, commonly in lower areas of the landscape. Also included are small areas of a soil that is similar to the Kenn soil but has a less gravelly subsoil and small areas of the Kenn soils that are cobbly or stony on the surface. The included soils make up about 15 percent of this complex, but areas of each soil are generally less than 3 acres.

The soils in this complex have medium potential for row crops and small grain. The erosion hazard is slight to moderate because of stream overflow. Good tilth can be maintained by returning crop residue to the soil. Minimum tillage and the use of cover crops help to maintain tilth and to reduce surface crusting.

The soils in this complex have medium potential for native grass and tame pasture. Tall fescue, bermudagrass, and bahiagrass are the main plants used for tame pasture. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

The soils have medium potential for woodland. Seedling mortality and plant competition are the main limitations in woodland management. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

Because of the risk of damaging floods, this unit does not have potential for building sites. Flooding, seepage, and content of small stones are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, roads and streets, dwellings, and small commercial buildings. Flooding can be reduced only by major flood control measures.

This complex is in capability subclass IVs; it is not assigned to a range site. The Kenn part is in woodland group 3o, and the Ceda part is in woodland group 3f.

25—Neff silt loam. This deep, moderately well drained, level to very gently sloping soil is on flood plains of local streams. It is subject to occasional flooding. Slopes are smooth and slightly concave and range from 0 to 2 percent. Individual areas are 5 to 80 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The upper part of the subsoil, to a depth of 18 inches, is dark yellowish brown silt loam. The middle part, to a depth of 35 inches, is yellowish brown, mottled silty clay loam. The lower part of the subsoil to a depth of 62 inches is dark yellowish brown silty clay loam.

This soil is medium in natural fertility and organic matter content. The surface layer and upper and middle parts of the subsoil are medium acid to very strongly acid. The lower part of the subsoil is slightly acid to very strongly acid. Permeability is moderately slow, and available water capacity is high. A water table is at a depth of 1/2 foot to 2 1/2 feet during winter and spring. Tilth is fair, and the soil can be worked throughout a medium range of moisture conditions. The root zone is deep and easily penetrated by roots.

Included in mapping are small areas of Cupco soils in concave areas and Rexor soils in higher areas or adjacent to stream channels. Included soils make up 20 percent of this map unit, but individual areas are commonly less than 2 acres.

This soil has high potential for row crops and small grain. The erosion hazard is slight to moderate because of stream overflow. Good tilth can be maintained by returning crop residue to the soil. Minimum tillage and the use of cover crops help to maintain tilth and to reduce surface crusting.

This soil has high potential for native grass and tame pasture. Tall fescue, bermudagrass, and bahiagrass are the main plants used for tame pasture. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland management. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

Because of the risk of damaging floods, this soil does not have potential for use as a building site. Flooding and wetness are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, roads and streets, dwellings, and small commercial buildings. These limitations can be reduced only by major flood control and drainage measures.

This soil is in capability subclass IIw and woodland group 3w. It is not assigned to a range site.

26—Neff and Rexor silt loams. This undifferentiated group consists of deep, moderately well drained Neff and Rexor soils, which are closely associated in an irregular pattern. These nearly level to very gently sloping soils are on flood plains that are subject to frequent flooding. Areas of each soil are large enough to map separately, but because of present and predicted use, they were not separated in mapping. Both soils are in most mapped areas, but a few areas contain only one soil. The mapped areas are dissected by stream channels and scour channels. Areas are long and narrow and about 100 to 500 feet wide. Slopes are 0 to 2 percent.

The Neff soil makes up about 45 percent of each mapped area. Typically, the surface layer, to a depth of 10 inches, is dark grayish brown silt loam. The upper part of the subsoil, to a depth of 16 inches, is dark yellowish brown silt loam. The middle part, to a depth of 35 inches, is brown, mottled silty clay loam. The lower part of the subsoil to a depth of 62 inches is dark yellowish brown, mottled silty clay loam.

The Neff soil is medium in natural fertility and organic matter content. The surface layer and upper part of the subsoil are medium acid to very strongly acid. The middle and lower parts of the subsoil are slightly acid to very strongly acid. Permeability is moderately slow, and available water capacity is high. A water table is at a depth of 1/2 foot to 2 1/2 feet during winter and spring.

The Rexor soil makes up about 40 percent of each mapped area. Typically, the surface layer, to a depth of 10 inches, is dark brown silt loam. The upper part of the subsoil, to a depth of 28 inches, is dark yellowish brown silty clay loam. The middle part, to a depth of 46 inches, is yellowish brown silty clay loam. The lower part of the subsoil to a depth of 68 inches is yellowish brown, mottled silt loam.

The Rexor soil is medium in natural fertility and organic matter content. It is medium acid or strongly acid throughout the profile. Permeability is moderate, and available water capacity is high. A water table is at a depth of 3 to 5 feet during winter and spring. Tilth is good, and the soil can be worked throughout a wide range of moisture conditions. The root zone is deep and is easily penetrated by roots.

Included in mapping are small areas of Ceda, Cupco, Dela, and Kenn soils. Ceda, Dela, and Kenn soils are nearer to the stream channel. Cupco soil occurs in concave areas. Included soils make up about 15 percent of mapped areas, but areas of each soil are less than 3 acres.

These soils have low potential for row crops and small grain. The erosion hazard is severe because of stream overflow.

These soils have high potential for native grass and tame pasture. Tall fescue, bermudagrass (fig. 4), and bahiagrass are the main plants used for tame pasture. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

These soils have medium to high potential for woodland. There are no significant limitations for woodland management. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

Because of the risk of damaging floods, the soils in this complex do not have potential for use as building sites. Flooding and wetness are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, roads and streets, dwellings, and small commercial buildings. These limitations can be reduced only by major flood control and drainage measures.

These soils are in capability subclass Vw and are not assigned to a range site. The Neff part is in woodland group 3w, and the Rexor part is in woodland group 2o.

27—Octavia-Carnasaw-Clebit association, cool, steep. This association consists of deep, moderately well drained Octavia soils, deep, well drained Carnasaw soils, and shallow, well drained Clebit soils. These soils are in a regular and repeating pattern. They are on the northern side of higher mountains in the southeastern part of the county. The Octavia soil is on colluvial benches on the lower part of side slopes and on foot slopes. The Carnasaw soil is on the upper part of side slopes. The Clebit soil is on the ridgetop and the upper part of side slopes where the sandstone crops out. The areas are mainly long and narrow and range from 40 to 300 acres. Each soil is in areas of 5 to 20 acres. Slopes are 30 to 45 percent.

Figure 4.—Improved bermudagrass and fescue pasture overseeded with white clover. The soils are Neff and Rexor silt loams along the drainageways and Shermore fine sandy loam, 1 to 3 percent slopes, on the side slopes.

The Octavia soil makes up about 30 percent of each mapped area. Typically, the surface layer is very dark grayish brown stony loam about 4 inches thick. The subsurface layer is brown stony loam 4 inches thick. The subsoil to a depth of 16 inches is strong brown gravelly loam. From 16 to 27 inches, the subsoil is yellowish red gravelly sandy clay loam, and from 27 to 45 inches, it is red gravelly clay loam. The lower part of the subsoil to a depth of 65 inches is coarsely mottled red, brown, and gray clay.

The Octavia soil is low in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer and subsurface layer and strongly acid or very strongly acid in the subsoil. Permeability is moderately slow, and available water capacity is high. A water table is at a depth of 3.5 to 5 feet during winter and spring.

The Carnasaw soil makes up about 25 percent of each mapped area. Typically, the surface layer is dark grayish brown stony loam about 5 inches thick. The subsurface layer, to a depth of 10 inches, is strong brown stony loam. The upper part of the subsoil, to a depth of 30 inches, is red clay. The lower part, to a depth of 42 inches, is coarsely mottled red, brown, and gray clay. The underlying material is dark grayish brown fractured shale tilted 40 degrees from horizontal.

The Carnasaw soil is low in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer and subsurface layer and strongly acid or very strongly acid in the subsoil. Permeability is slow, and available water capacity is medium.

The Clebit soil makes up 15 percent of each mapped area. Typically, the surface layer is dark brown stony fine sandy loam 5 inches thick. The subsoil, to a depth of 16 inches, is brown very stony fine sandy loam. Hard sandstone that is tilted 40 degrees from horizontal is below the subsoil.

The Clebit soil is low in natural fertility and organic matter content. It is slightly acid to strongly acid in the surface layer and medium acid to very strongly acid in the subsoil. Permeability is moderately rapid, and available water capacity is very low.

Included in mapping are areas, commonly less than 5 acres, of the Bengal, Denman, Panama, and Pirum soils. Also included are areas of sandstone outcrop. The Bengal, Denman, and Pirum soils are on side slopes, and the Panama soils are on foot slopes. The included soils and outcrops of rock make up 30 percent of each mapped area.

The soils in this association have low potential for row crops and small grain. Large stones on the surface, shallowness to rock, the severe erosion hazard, and steep slopes are limitations that are very difficult to overcome.

The soils are best suited to grass or woodland. They have low potential, however, for native grass and for tame pasture. The steep slopes and stones on the surface are too numerous for preparation of a seedbed and the use of equipment. The quality and quantity of the native grass can be maintained or improved by brush control, proper grazing, and fire prevention.

The soils in this association have medium potential for woodland. Stones and steep slopes are limitations to management and equipment use. Seedling mortality is also a concern in woodland management. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

The soils in this association have low potential for most urban uses. Steep slopes, large stones on the surface, high shrink-swell potential, and shallowness to rock are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, small commercial buildings, and dwellings.

This association is in capability subclass VIIs and the Savannah Breaks range site. The Octavia part is in woodland group 4x. The Carnasaw part is in woodland group 4x. The Clebit part is in woodland group 5x.

28—Pirum fine sandy loam, 1 to 3 percent slopes. This moderately deep, well drained, gently sloping soil is on tops and side slopes of low ridges in the broad valleys. Slopes are smooth and convex. Areas are 5 to 20 acres.

Typically, the surface layer is brown fine sandy loam 7 inches thick. The subsurface layer, to a depth of 13 inches, is brown fine sandy loam. The subsoil, to a depth of 30 inches, is yellowish red sandy clay loam. Hard sandstone that is tilted 30 degrees from horizontal is below the subsoil.

This soil is low in natural fertility and organic matter content. The surface layer is strongly acid or very strongly acid except for areas that have been limed. The subsoil is strongly acid or very strongly acid. Permeability is moderate, and available water capacity is low. The soil has good tilth and can be worked throughout a wide range of moisture conditions. The root zone is moderately deep and easily penetrated by roots.

Included in mapping are areas of Clebit and Shermore soils. Also included are a few areas of a soil that is similar to the Pirum soil, except the lower part of the subsoil is clay and is underlain by shale. Clebit soils commonly are on the higher part of the landscape. Shermore soils commonly are on the lower foot slopes. The included soils make up 20 percent of this map unit, but separate areas are less than 3 acres.

This soil has high potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate where cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has medium potential for native grass and tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Stands can be maintained or improved by preventing wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

This soil has medium potential for most urban uses. The depth to rock is the main limitation for septic tank absorption fields, sewage lagoons, trench sanitary landfills, roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IIe, woodland group 4o, and the Sandy Savannah range site.

29—Pirum fine sandy loam, 3 to 5 percent slopes. This moderately deep, well drained, gently sloping soil is on ridgetops and side slopes of low ridges in the broad valleys. Slopes are smooth and convex. Areas are 5 to 20 acres.

Typically, the surface layer is brown fine sandy loam about 6 inches thick. The subsurface layer, to a depth of 12 inches, is brown fine sandy loam. The upper part of the subsoil, to a depth of 24 inches, is yellowish red clay loam. The lower part, to a depth of 31 inches, is yellowish red sandy clay loam. Hard sandstone that is tilted 30 degrees from horizontal is below the subsoil.

This soil is low in natural fertility and organic matter content. The surface layer is strongly acid or very strongly acid except for areas that have been limed. The subsoil is strongly acid or very strongly acid. Permeability is moderate, and available water capacity is low. The soil has good tilth and can be worked throughout a wide range of moisture conditions. The root zone is moderately deep and easily penetrated by roots.

Included in mapping are areas of Clebit and Shermore soils. Also included are a few small areas of Pirum soil where the surface layer has been eroded. The Clebit soils generally occur on the higher part of the landscape, and Shermore soils generally occur on the lower foot slopes. The included soils make up about 20 percent of mapped areas, but individual areas generally are less than 2 acres.

This soil has high potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is severe where cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has medium potential for native grass and tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Stands can be maintained or improved by preventing wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

This soil has medium potential for most urban uses. The depth to rock is the main limitation for septic tank absorption fields, sewage lagoons, trench sanitary landfills, roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IIIe, woodland group 4o, and the Sandy Savannah range site.

30—Pirum-Carnasaw-Panama association, steep. This association consists of moderately deep, well drained Pirum soils, deep, well drained Carnasaw soils, and deep, moderately well drained Panama soils. These soils are in a regular and repeating pattern on the southern side of the higher mountains. Pirum and Carnasaw soils are on the crests and side slopes. Panama soils are on the colluvial benches of the side slopes and on the colluvial foot slopes. Mapped areas are mostly long and narrow and range from 40 to 600 acres. Areas of each soil are 2 to 20 acres. Slopes are 12 to 25 percent.

The Pirum soil makes up 30 percent of each mapped area. Typically, the surface layer is dark brown stony fine sandy loam about 5 inches thick. The subsurface layer, to a depth of 11 inches, is yellowish brown stony fine sand. The upper part of the subsoil, to a depth of 31 inches, is yellowish red gravelly sandy clay loam; and the lower part, to a depth of 36 inches, is yellowish red gravelly loam. Hard sandstone that is tilted 40 degrees from horizontal is below the subsoil.

The Pirum soil is low in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer and subsurface layer. The subsoil is strongly acid or very strongly acid. Permeability is moderate, and available water capacity is low.

The Carnasaw soil makes up 25 percent of each mapped area. Typically, the surface layer is grayish brown stony fine sandy loam about 4 inches thick. The subsurface layer, to a depth of 9 inches, is yellowish brown stony fine sandy loam. The upper part of the subsoil, to a depth of 16 inches, is strong brown clay loam. The middle part, to a depth of 40 inches, is yellowish red clay. The lower part of the subsoil, to a depth of 45 inches, is coarsely mottled red, brown, and gray clay. The underlying material is dark grayish brown shale that is tilted 40 degrees from horizontal.

The Carnasaw soil is low in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer and subsurface layer. The subsoil is strongly acid or very strongly acid. Permeability is slow, and available water capacity is medium.

The Panama soil makes up 25 percent of each mapped area. Typically, the surface layer is brown stony loam about 5 inches thick. The upper part of the subsoil, to a depth of 15 inches, is yellowish red stony loam. The middle part, to a depth of 49 inches, is yellowish red and strong brown cobbly clay loam. The lower part of the subsoil to a depth of 72 inches is coarsely mottled red, brown, and gray clay.

The Panama soil is low in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer. The subsoil is strongly acid or very strongly acid. Permeability is moderately slow, and available water capacity is medium. A water table is at a depth of 3.5 to 5 feet during winter and spring.

Included in mapping are areas of the Denman, Clebit, and Octavia soils and sandstone rock outcrop. Also included are areas of soils that are similar to Pirum soils but have more than 35 percent coarse fragments in the subsoil. Areas of included soils and sandstone rock outcrops are 1 to 5 acres and make up 20 percent of the association.

The soils in this association have low potential for row crops and small grain. Large stones on the surface, the severe erosion hazard, and steep slopes are limitations that are very difficult to overcome.

The soils are best suited to grass or woodland. They have medium potential for native grass and low potential for tame pasture. The steep slopes and numerous stones on the surface make it difficult to prepare a seedbed and use equipment. The quality and quantity of

native grass can be maintained or improved by brush control, proper grazing, and fire prevention.

The soils have medium potential for woodland. Stones and steep slopes are limitations to woodland management and equipment use. Seedling mortality is also a concern. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

The soils have low potential for most urban uses. Steep slopes, large stones on the surface, high shrink-swell potential, slow permeability, and depth to rock are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, small commercial buildings, and dwellings.

This association is in capability subclass VIIs, woodland group 4x, and the Sandy Savannah range site.

31—Rexor silt loam. This deep, moderately well drained, nearly level soil is on flood plains of major streams. It is subject to occasional flooding. Most mapped areas are more than 100 acres, but some long, narrow areas on the smaller tributaries are 3 to 20 acres. Slopes are broad and smooth and range from 0 to 1 percent.

Typically, the surface layer is brown silt loam about 10 inches thick. The upper part of the subsoil, to a depth of 32 inches, is brown silty clay loam, and the lower part to a depth of 72 inches is yellowish brown, mottled silt loam.

This soil is medium in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer and upper part of the subsoil. The lower part of the subsoil is medium acid to very strongly acid. Permeability is moderate, and available water capacity is high. A water table is at a depth of 3 to 5 feet during winter and spring. Tilth is good, and the soil can be worked throughout a wide range of moisture conditions. The root zone is deep and easily penetrated by roots.

Included in mapping are small areas of Cupco, Dela, Kenn, and Neff soils. Cupco and Neff soils occur in concave areas. Dela and Kenn soils occur adjacent to the stream channel. Included soils make up 20 percent of this map unit, but separate areas are generally less than 5 acres.

This soil has high potential for row crops and small grain. The erosion hazard is slight to moderate because of stream overflow. Good tilth can be maintained by returning crop residue to the soil. Minimum tillage and the use of cover crops help to maintain tilth and to reduce surface crusting.

This soil has high potential for native grass and tame pasture. Tall fescue, bermudagrass, and bahiagrass are the main plants used for tame pasture. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has high potential for woodland. It has no significant limitations for woodland management. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

Because of the risk of damaging floods, this unit does not have potential for use as building sites. Flooding is the main limitation for septic tank absorption fields, sewage lagoons, trench sanitary landfills, roads and streets, dwellings, and small commercial buildings. It can be reduced only by major flood control measures.

This soil is in capability subclass IIw and woodland group 2o. It is not assigned to a range site.

32—Sallisaw loam, 1 to 3 percent slopes. This deep, well drained, very gently sloping soil is on old stream terraces on uplands. Slopes are smooth and slightly convex. Areas are 10 to 100 acres.

Typically, the surface layer is brown loam about 8 inches thick. The upper part of the subsoil, to a depth of 13 inches, is brown loam. The middle part, to a depth of 34 inches, is reddish brown clay loam. The lower part of the subsoil to a depth of 72 inches is strong brown very gravelly clay loam.

This soil is medium in natural fertility and organic matter content. It is slightly acid or medium acid in the surface layer and medium acid or strongly acid in the subsoil. Permeability is moderate, and available water capacity is medium. Tilth is good, and the soil can be worked throughout a wide range of moisture conditions. The root zone is deep and is easily penetrated by roots.

Included in mapping are small areas of Shermore, Wilburton, and Stigler soils. Shermore soils are on colluvial foot slopes that are higher on the landscape. Wilburton soils are in similar areas. Stigler soils occur in slightly concave areas. Also included are soils that are similar to the Sallisaw soil, except their subsoil is mottled with gray and they are poorly drained to somewhat poorly drained. Included soils make up 20 percent of this map unit, but individual areas are commonly less than 5 acres.

This soil has high potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate where cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has medium potential for native grass and tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Stands can be maintained or improved by protecting against damage by wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

This soil has high potential for most urban uses. The moderate permeability and moderate clay content are the main limitations for septic tank absorption fields, sewage lagoons, and trench sanitary landfills but can be overcome by use of proper design and construction.

This soil is in capability subclass IIe and woodland group 3o. It is not assigned to a range site.

33—Shermore fine sandy loam, 1 to 3 percent slopes. This soil is deep, moderately well drained, and very gently sloping. It is on foot slopes and terraces in broad valleys. Areas are 5 to 15 acres.

Typically, the surface layer is brown fine sandy loam about 7 inches thick. The upper part of the subsoil, to a depth of 12 inches, is brown loam. The middle part of the subsoil, to a depth of 30 inches, is strong brown clay loam. The lower part of the subsoil to a depth of 64 inches is coarsely mottled brown and gray, brittle clay loam.

This soil is medium in natural fertility and organic matter content. The surface layer and the upper part of the subsoil are slightly acid to strongly acid. The lower part of the subsoil is medium acid to very strongly acid. Permeability is moderately slow, and available water capacity is medium. A water table is at a depth of 1 to 3 1/2 feet during winter and spring. The soil has good tilth, and it can be worked throughout a wide range of moisture conditions. The root zone is moderately deep and is easily penetrated by roots.

Included in mapping are small areas of Stigler soils in slightly depressed areas. The included soils make up 10 percent of each mapped area, but separate areas are less than 4 acres.

This soil has high potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate where cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has medium potential for native grass and tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Stands can be maintained or improved by preventing wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

This soil has medium potential for most urban uses. Wetness is the main limitation for septic tank absorption fields, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IIe and woodland group 3o. It is not assigned to a range site.

34—Shermore fine sandy loam, 3 to 5 percent slopes. This deep, moderately well drained, gently sloping soil is on foot slopes adjacent to the mountains and ridges. Slopes are smooth and slightly convex. Areas are 5 to 160 acres.

Typically, the upper part of the surface layer is dark brown fine sandy loam about 6 inches thick, and the lower part is brown fine sandy loam to a depth of 14 inches. The subsoil to a depth of 18 inches is strong brown loam. From 18 to 36 inches, the subsoil is yellowish brown mottled clay loam, and from 36 to 70 inches, it is coarsely mottled red, brown, and gray, brittle clay loam. The lower part of the subsoil to a depth of 80 inches is light yellowish brown mottled clay loam.

This soil is medium in natural fertility and organic matter content. The surface layer and upper part of the subsoil are slightly acid to strongly acid. The lower part of the subsoil is medium acid to very strongly acid. Permeability is moderately slow, and available water capacity is medium. A water table is at a depth of 1 foot to 3 1/2 feet during winter and spring. This soil has good tilth and can be worked throughout a wide range of moisture conditions. The root zone, which is easily penetrated by roots, is moderately deep.

Included in mapping are small areas of Sallisaw and Stigler soils. The Stigler soils are in lower adjacent areas. The included soils make up 15 percent of this map unit, but individual areas are less than 5 acres.

This soil has high potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is severe where cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has medium potential for native grass and tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Stands can be maintained or improved by preventing wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

This soil has medium potential for most urban uses. Wetness is the main limitation for septic tank absorption fields, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IIIe and woodland group 3o. It is not assigned to a range site.

35—Shermore fine sandy loam, 2 to 5 percent slopes, eroded. This deep, moderately well drained, very gently sloping and gently sloping, eroded soil is on foot slopes and terraces in broad valleys. In about 30 percent of the acreage, the surface layer and material from the upper part of the subsoil are mixed by plowing. There are a few crossable gullies and many rills as a result of water erosion. Areas are long and narrow and about 5 to 20 acres.

Typically, the surface layer is brown fine sandy loam about 6 inches thick. The upper part of the subsoil, to a depth of 16 inches, is strong brown clay loam. The middle part, to a depth of 36 inches, is brownish yellow clay loam. The lower part of the subsoil to a depth of 64 inches is coarsely mottled brown, red, and gray, brittle clay loam.

This soil is low in natural fertility and organic matter content. The surface layer is slightly acid to strongly acid, and the subsoil is medium acid to very strongly acid. Permeability is moderately slow, and available water capacity is medium. A water table is at a depth of 1 to 3 1/2 feet during winter and spring. Tilth is good, and the soil can be worked throughout a wide range of moisture conditions. The root zone, which is easily penetrated by roots, is moderately deep.

Included in mapping are small areas of Stigler, Pirum, and Sallisaw soils. The Stigler soils are in lower adjacent areas. The included soils make up 20 percent of this map unit, but individual areas are less than 5 acres.

This soil has medium potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is severe where cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has medium potential for native grass and tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Stands can be maintained or improved by preventing wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

This soil has medium potential for most urban uses. Wetness is the main limitation for septic tank absorption fields, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IIIe and woodland group 3o. It is not assigned to a range site.

36—Sobol silt loam, 2 to 5 percent slopes. This is a moderately deep, moderately well drained, very gently sloping or gently sloping soil on uplands. It is on low ridges in broad valleys. Slopes are smooth and convex. Areas are 10 to 100 acres.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil, to a depth of 14 inches, is brown clay loam. From 14 to 24 inches, it is dark yellowish brown clay; and from 24 to 36 inches, it is olive gray silty clay. Olive brown shale that is tilted 35 degrees from horizontal is below the subsoil.

This soil is medium in natural fertility and organic matter content. The surface layer is medium acid or strongly acid. The subsoil is slightly acid to very strongly acid in the upper part and slightly acid to moderately alkaline in the lower part. Permeability is slow, and available water capacity is medium. The root zone is moderately deep, but root penetration is moderately restricted because of the clay subsoil.

Included in mapping are areas of Tamaha, Wister, and Shermore soils. These soils are on the lower part of slopes. Also included, on ridge crests, are areas of a shallow soil and a moderately deep soil that have a lower content of clay than this soil. Included soils make up about 20 percent of each mapped area. Areas of each included soil are less than 3 acres.

This soil has medium potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate where cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has medium potential for native grass and tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has low potential for woodland. Stands do not grow to any significant height on this soil.

The soil has low potential for most urban uses. The high shrink-swell potential, depth to bedrock, and wetness are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IVe and the Loamy Prairie range site. It is not assigned to a woodland group.

37—Sobol-Rock outcrop complex, 5 to 20 percent slopes. This complex consists of areas of moderately well drained, moderately deep Sobol soils and areas of sandstone Rock outcrop that are so intermingled that they could not be separated at the scale selected for mapping. These sloping to moderately steep soils are on ridges in broad valleys.

The Sobol soil makes up about 65 percent of each mapped area. Typically, the surface layer is dark grayish brown stony clay loam 6 inches thick. The upper part of the subsoil, to a depth of 10 inches, is brown clay. The middle part, to a depth of 28 inches, is dark yellowish brown clay. The lower part of the subsoil, to a depth of 38 inches, is brown clay. Olive shale tilted 40 degrees from horizontal is below the subsoil.

The Sobol soil is medium in natural fertility and organic matter content. It is medium acid or strongly acid in the surface layer, slightly acid to very strongly acid in the upper and middle parts of the subsoil, and slightly acid, to moderately alkaline in the lower part of the subsoil. Permeability is slow, and available water capacity is medium. The root zone is moderately deep, but root penetration is moderately restricted because of the clay subsoil.

Rock outcrop makes up about 15 percent of each mapped area. Typically, it is bare sandstone that extends from a few inches to 2 feet above the soil surface.

Included in mapping are areas of Tamaha and Tuskahoma soils. Also included are small areas of a deep stony soil on foot slopes. Included soils make up about 20 percent of each mapped area. Individual areas of included soils are less than 2 acres.

The Sobol soil has low potential for row crops and small grain. Steep slopes, rock outcrops, stones on the surface, and the severe erosion hazard are the main limitations.

The Sobol soil is best suited to grass. It has medium potential for native grass and low potential for tame pasture. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

The Sobol soil has low potential for woodland. Stands do not grow well or reach any significant height on this soil.

The Sobol soil has low potential for most urban uses. Steep slopes, depth to bedrock, rock outcrops, and wetness are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This complex is in capability subclass VIIs. It is not assigned to a woodland suitability group. The Sobol part is in the Loamy Prairie range site.

38—Stigler silt loam, 0 to 1 percent slopes. This deep, moderately well drained, nearly level soil is in broad valleys in uplands. Slopes are smooth and slightly concave. Areas are 20 to 300 acres.

Typically, the surface layer is dark grayish brown silt loam about 12 inches thick. The subsurface layer, to a depth of 24 inches, is brown silt loam. The subsoil, to a depth of 36 inches, is yellowish brown silty clay loam with red, gray, and yellowish mottles. From 36 to 48 inches, the subsoil is dark yellowish brown silty clay with brown and gray mottles, and from 48 to 72 inches, it is coarsely mottled gray, brown, and red silty clay loam.

Included in mapping are small areas of Counts, Tamaha, and Sobol soils. Counts and Tamaha soils are in similar areas, but the Sobol soils are on the higher part of the landscape. Also included are deep soils, on mounds, that have thicker surface and subsurface layers and less clay in the upper part of the subsoil than the Stigler soil. Typically, the uncultivated mounds are circular areas that are 20 feet in diameter and 2 feet higher than the adjacent Stigler soil. In cultivated areas the mound sites are difficult to observe because they have been plowed down. The included soils make up 20 percent of each mapped area, but areas of each soil are generally less than 5 acres.

This soil is medium in natural fertility and organic matter content. It is medium to very strongly acid in the surface and subsurface layers. The upper and middle parts of the subsoil are medium or strongly acid, and the lower part is medium acid to mildly alkaline. Permeability is very slow, and available water capacity is high. A water table is at a depth of 2 to 3 feet during winter and spring. The soil has fair tilth and can be worked throughout a medium range of moisture conditions. The root zone is deep and easily penetrated by roots.

This soil has high potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is slight where cultivated crops are grown. Minimum tillage, the use of cover crops, and contour farming help to reduce runoff and to control erosion.

This soil has high potential for native grass and tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Stands can be maintained or improved by preventing damage by wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

This soil has low potential for most urban uses. The high shrink-swell potential, very slow permeability, and wetness are the main limitations for septic tank absorption fields, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IIw, woodland group 4o, and the Loamy Savannah range site.

39—Stigler silt loam, 1 to 3 percent slopes. This deep, moderately well drained, very gently sloping soil is in convex areas in broad valleys on uplands. Slopes are complex and gently undulating. Areas are 10 to 120 acres.

Typically, the surface layer is dark grayish brown silt loam about 11 inches thick. The subsurface layer is

brown silt loam about 11 inches thick. The subsoil to a depth of 55 inches is yellowish brown silty clay mottled with red, yellow, and gray. Below that depth it is coarsely mottled yellowish brown, brown, and gray silty clay.

This soil is medium in natural fertility and organic matter content. The surface and subsurface layers are strongly acid or very strongly acid. The upper part of the subsoil is medium acid to very strongly acid, and the lower part of the subsoil is strongly acid to mildly alkaline. Permeability is very slow, and available water capacity is high. A water table is at a depth of 2 to 3 feet during winter and spring. Tilth is fair, and the soil can be worked throughout a medium range of moisture content. The root zone is deep and easily penetrated by roots.

Included in mapping are small areas of Counts, Tamaha, and Sobol soils. Counts and Tamaha soils are in similar areas, but the Sobol soils are on the higher part of the landscape. Also included are deep soils, on mounds, where the surface and subsurface layers are thicker and the upper part of the subsoil has less clay than in this Stigler soil. Typically, the uncultivated mounds are circular areas 20 feet in diameter and 2 feet higher than the adjacent Stigler soil. In cultivated areas the mounds are difficult to see because they have been plowed down. The included soils make up 20 percent of each mapped area, but individual areas are generally less than 3 acres.

This soil has high potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate where cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has high potential for native grass and tame pasture. Bermudagrass (fig. 5), tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Stands can be maintained or improved by preventing damage by wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

This soil has low potential for most urban uses. The high shrink-swell potential, very slow permeability, and wetness are the main limitations for septic tank absorption fields, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IIe, woodland group 4o, and the Loamy Savannah range site.

40—Tamaha silt loam, 1 to 3 percent slopes. This soil is deep, moderately well drained, and very gently sloping. It is in convex areas in broad valleys on uplands. Slopes are smooth and slightly convex. Areas are 10 to 100 acres.

Typically, the surface layer, to a depth of 13 inches, is dark grayish brown silt loam. The upper part of the subsoil, to a depth of 19 inches, is yellowish brown silty clay loam. The middle part of the subsoil, to a depth of 37 inches, is yellowish brown clay with grayish brown and reddish mottles. The lower part of the subsoil to a depth of 72 inches is coarsely mottled red, brown, and gray clay.

This soil is medium in natural fertility and organic matter content. The surface layer is slightly acid to very strongly acid. The upper and middle parts of the subsoil are medium acid to very strongly acid, and the lower part is neutral to strongly acid. Permeability is very slow, and available water capacity is high. A water table is at a depth of 1 to 2 feet during winter and spring. The soil has fair tilth and can be worked throughout a medium range of moisture conditions. The root zone is deep, but root penetration is moderately restricted because of the clayey subsoil.

Included in mapping are areas of the Counts, Sobol, and Stigler soils. The Counts and Stigler soils are in similar areas, but the Sobol soils are on the higher part of the landscape. Also included are deep soils, on mounds, that have thicker surface and subsurface layers and have less clay in the upper part of the subsoil than the Tamaha soil. Typically, the uncultivated mounds are circular areas that are 20 feet in diameter and 2 feet higher than the adjacent Tamaha soil. In cultivated areas the mounds are difficult to observe because they have been plowed down. The included soils make up 20 percent of this map unit, but individual areas are generally less than 5 acres.

This soil has high potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate in cultivated areas. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has high potential for native grass and for tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Stands can be maintained or improved by protecting against damage by wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

The potential is low for most urban uses. The high shrink-swell potential, very slow permeability, and wetness are the main limitations for septic tank

Figure 5.—Large bales of bermudagrass hay harvested on Stigler silt loam, 1 to 3 percent slopes.

absorption fields, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IIe, woodland group 4o, and the Loamy Savannah range site.

41—Tamaha silt loam, 3 to 5 percent slopes. This soil is deep, moderately well drained, and gently sloping. It is on side slopes of low ridges within broad valleys in uplands. Slopes are smooth and slightly convex. Areas are 10 to 80 acres in size.

Typically, the surface layer is dark grayish brown silt loam to a depth of 11 inches. The upper part of the subsoil, to a depth of 18 inches, is yellowish brown silty clay loam. The middle part of the subsoil, to a depth of 48 inches, is yellowish brown silty clay mottled with grayish brown and yellowish red. The lower part of the subsoil to a depth of 64 inches is coarsely mottled brownish and gray clay.

This soil is medium in natural fertility and organic matter content. Reaction is slightly acid to very strongly acid in the surface layer. The upper and middle parts of the subsoil are medium acid to very strongly acid, and the lower part is neutral to strongly acid. Permeability is very slow, and available water capacity is high. A water table is at a depth of 1 to 2 feet during winter and spring. Tilth is fair, and the soil can be worked throughout a medium range of moisture content. The root zone is deep, but root penetration is moderately restricted because of the clay subsoil.

Included in mapping are areas of the Sobol, Stigler, and Wister soils. The Sobol soils are on the higher part of the landscape. The Stigler and Wister soils are in similar areas. Also included are deep soils, on mounds, that have thicker surface and subsurface layers and less clay in the upper part of the subsoil than the Tamaha

soils. Typically, the uncultivated mounds are circular areas that are 20 feet in diameter and 2 feet higher than the adjacent Tamaha soils. In cultivated areas the mounds are difficult to observe because they have been plowed down. The included soils make up 20 percent of each mapped area, but individual areas are generally less than 3 acres.

This soil has medium potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate to severe if cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has high potential for native grass and medium potential for tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Stands can be maintained or improved by preventing damage by wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

The potential is low for most urban uses. The high shrink-swell potential, very slow permeability, and wetness are the main limitations for septic tank absorption fields, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IIIe, woodland group 4o, and the Loamy Savannah range site.

42—Tuskahoma-Sobol complex, 3 to 8 percent slopes. This complex consists of areas of the moderately well drained, shallow Tuskahoma soil and the moderately well drained, moderately deep Sobol soil. These soils are so intermingled that they could not be separated at the scale used for mapping. They are on side slopes of ridges in broad valleys. Mapped areas are 20 to 150 acres. Areas of each soil are less than 5 acres.

The Tuskahoma soil makes up 40 percent of each area mapped. Typically, the surface layer is dark grayish brown loam about 6 inches thick. The upper part of the subsoil, to a depth of 12 inches, is grayish brown, mottled clay. The lower part, to a depth of 18 inches, is grayish brown, mottled shaly clay. The underlying material is olive gray shale that is tilted 35 degrees from horizontal.

The Tuskahoma soil is low in natural fertility and organic matter content. The available water capacity is very low, and permeability is very slow. This soil is slightly acid or medium acid in the surface layer and strongly acid to mildly alkaline in the subsoil.

The Sobol soil makes up 35 percent of each area mapped. Typically, the surface layer is dark grayish brown loam about 10 inches thick. The upper part of the subsoil, to a depth of 16 inches, is brown clay loam. The middle part, to a depth of 24 inches, is grayish brown, mottled clay. The lower part of the subsoil, to a depth of 32 inches, is olive, mottled shaly clay. The underlying material is olive shale that is tilted 35 degrees from horizontal.

Sobol soils are medium in natural fertility and organic matter content. Permeability is slow, and available water capacity is medium. This soil is medium acid or strongly acid in the surface layer. The upper and middle parts of the subsoil are slightly acid to very strongly acid, and the lower part is medium acid to moderately alkaline.

Included in mapping are areas of Clebit, Shermore, and Wister soils. Also included is a moderately deep soil formed in sandstone along crests of the ridges. Included soils make up about 25 percent of each mapped area, but areas of each included soil are less than 3 acres.

The soils have low potential for row crops and small grain. The depth to bedrock and the severe erosion hazard are the main limitations.

The soils are best suited to grass. They have medium potential for native grass and tame pasture. Tall fescue, bermudagrass, and bahiagrass are the main plants used for tame pasture. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by fire prevention.

The soils have low potential for woodland. Trees do not grow to any significant height on these soils. Planting trees for commercial woodland production is not recommended. The main concern is seedling mortality.

The soils have low potential for most urban uses. The depth to bedrock, wetness, and high shrink-swell potential are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This complex is in capability subclass VIe. The Tuskahoma part is in woodland group 5d and the Shallow Savannah range site. The Sobol part is not assigned to a woodland group and is in the Loamy Prairie range site.

43—Tuskahoma-Sobol complex, 8 to 20 percent slopes. This complex consists of areas of moderately well drained, shallow Tuskahoma soils and moderately well drained, moderately deep Sobol soils. These soils are so intermingled that they could not be separated at the scale used for mapping. They are on side slopes of ridges in broad valleys. Mapped areas are long, narrow delineations of 10 to 100 acres. Areas of each soil are less than 5 acres.

Tuskahoma soils make up 45 percent of each area mapped. Typically, the surface layer is dark brown stony loam about 5 inches thick. From 5 to 10 inches, the subsoil is brown, mottled clay, and from 10 to 14 inches,

it is dark gray, mottled shaly clay. The underlying material is dark gray shale that is tilted 40 degrees from horizontal.

Tuskahoma soils are low in natural fertility and organic matter content. Available water capacity is very low, and permeability is very slow. The soil is slightly acid or medium acid in the surface layer and strongly acid to mildly alkaline in the subsoil.

Sobol soils make up 25 percent of each area mapped. Typically, the surface layer is dark grayish brown stony loam about 6 inches thick. The subsoil to a depth of 10 inches is dark yellowish brown clay loam. From 10 to 20 inches, it is brown clay; and from 20 to 24 inches, it is dark grayish brown shaly clay. The underlying material is dark grayish brown shale tilted 40 degrees from horizontal.

Sobol soils are medium in natural fertility and organic matter content. Permeability is slow, and available water capacity is medium. The soil is medium acid or strongly acid in the surface layer, slightly acid to very strongly acid in the upper part of the subsoil, and moderately alkaline to slightly acid in the lower subsoil.

Included in mapping are areas of Clebit and Shermore soils. Also included is a moderately deep soil formed in sandstone along crests of the ridges. Included soils make up about 30 percent of each mapped area, but individual areas of each soil are less than 3 acres.

The Tuskahoma and Sobol soils have low potential for row crops and small grain. Large stones on the surface, the severe erosion hazard, and slopes are limitations that are very difficult to overcome.

The soils are best suited to grass or woodland. They have medium potential for native grass and low potential for tame pasture. The steep slopes and numerous stones on the surface make it difficult to prepare a seedbed and use equipment. The quality and quantity of native grass can be maintained or improved by brush control, proper grazing, and fire prevention. Where it is practical to remove stones from the surface, the potential for tame pasture can be improved.

The soils have low potential for woodland. Stands do not grow to any significant height on these soils. Stones and steep slopes are limitations to woodland management and equipment use. Seedling mortality is also a concern.

The soils in this complex have low potential for most urban uses. The moderately steep slopes, wetness, high shrink-swell potential, and shallowness to rock are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, small commercial buildings, and dwellings.

This complex is in capability subclass VIIs. The Tuskahoma part is in woodland group 5x and the Shallow Savannah range site. The Sobol part is not assigned to a woodland group and is in the Loamy Prairie range site.

44—Wilburton cobbly loam, 2 to 8 percent slopes. This deep, well drained, very gently sloping to sloping soil is in broad valleys in uplands. Areas are 10 to 50 acres.

Typically, the surface layer is brown cobbly loam about 6 inches thick. The upper part of the subsoil, to a depth of 11 inches, is reddish brown cobbly loam. The middle part, to a depth of 28 inches, is yellowish red cobbly clay loam. The lower part of the subsoil, to a depth of 46 inches, is yellowish red, mottled very cobbly clay loam. The underlying material is reddish yellow, mottled very cobbly sandy clay loam.

This soil is low in natural fertility and organic matter content. It is slightly acid to strongly acid in the surface layer and medium acid to very strongly acid in the subsoil. Permeability is moderate, and available water capacity is medium.

Included in mapping are areas of Sallisaw soils and soils that are similar to the Wilburton soil, except bedrock is at a depth of less than 40 inches. Other soils are included that are similar to the Wilburton soil but are more than 60 inches deep. Also included are small depressions that are poorly drained. The included soils make up 20 percent of this map unit, but individual areas are generally less than 3 acres.

This soil has medium potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate if cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

The potential is medium for native grass and tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing fire damage.

The potential is medium for woodland. The main concern is seedling mortality. Stands can be maintained or improved by protecting against damage by wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

The potential is medium for most urban uses. The presence of large stones is the main limitation for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IVe, woodland group 4f, and the Sandy Savannah range site.

45—Wilburton cobbly loam, 8 to 20 percent slopes. This soil is deep, well drained, and strongly sloping to moderately steep. It is in broad valleys in uplands in areas of 10 to 60 acres.

Typically, the surface layer is dark brown cobbly loam about 7 inches thick. The upper part of the subsoil, to a depth of 13 inches, is brown cobbly loam. The middle

part, to a depth of 36 inches, is reddish brown very cobbly sandy clay loam. The lower part, to a depth of 52 inches, is yellowish red, mottled very cobbly sandy clay loam. The underlying material is coarsely mottled brownish yellow, pale brown, reddish yellow, and light gray very cobbly loam.

This soil is low in natural fertility and organic matter content. It is slightly acid to strongly acid in the surface layer and medium acid to very strongly acid in the subsoil. Permeability is moderate, and available water capacity is medium.

Included in mapping are areas of Carnasaw, Bengal, and Sallisaw soils. Also included is a soil similar to the Wilburton soil, except bedrock is at depths of less than 50 inches, or the subsoil is more clayey. Also included is a soil that has a high percentage of cobbles or stones on the surface. The included soils make up about 20 percent of this map unit, but individual areas are generally less than 3 acres.

This soil has low potential for row crops and small grain. The moderately steep slopes and the severe erosion hazard are the main limitations.

The soil is best suited to grass or woodland. It has medium potential for native grass and for tame pasture. Tall fescue, bermudagrass, and bahiagrass are the main plants used for tame pasture. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. The main concerns are equipment limitations and seedling mortality. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

This soil has low potential for most urban uses. Slope is the main limitation for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass VIe, woodland group 4f, and the Sandy Savannah range site.

46—Wister silt loam, 1 to 3 percent slopes. This deep, moderately well drained, very gently sloping soil is in broad valleys in uplands. Slopes are complex and undulating. Areas are 10 to 60 acres.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsurface layer is grayish brown silt loam about 6 inches thick. The upper part of the subsoil, to a depth of 24 inches, is dark yellowish brown mottled clay. The middle part, to a depth of 41 inches, is yellowish brown mottled clay. The lower part of the subsoil, to a depth of 52 inches, is light olive brown mottled clay. The underlying material to a depth of 58 inches is olive gray shale that is tilted 30 degrees from the horizontal.

This soil is medium in natural fertility and organic matter content. The surface layer, subsurface layer, and upper part of the subsoil are medium acid to very strongly acid. The lower part of the subsoil is medium acid to neutral. Permeability is very slow, and available water capacity is high. A water table is at a depth of 1 to 2 feet during winter and spring. This soil is saturated with water in the upper part of the solum late in winter and early in spring. The root zone is deep, but root penetration is moderately restricted because of the clay subsoil.

Included in mapping are small areas of the Sobol, Counts, and Stigler soils. The Sobol soil occurs in the higher areas of the landscape. Counts and Stigler soils occur in similar areas. Also included are deep soils, on mounds, that have thicker surface and subsurface layers and less clay in the upper part of the subsoil than the Wister soil. Typically, the uncultivated mounds are circular areas 20 feet in diameter and 2 feet higher than the adjacent Wister soil. In cultivated areas the mounds are difficult to observe because they have been plowed down. The included soils make up 20 percent of each mapped area, but individual areas are generally less than 3 acres.

This soil has high potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has high potential for native grass and for tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has low potential for woodland. Trees do not grow well on this soil.

This soil has low potential for most urban uses. The high shrink-swell potential, wetness, and content of clay are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IIIe and the Claypan Prairie range site. It is not assigned to a woodland group.

47—Woodson Variant silty clay loam, 0 to 3 percent slopes. This soil is deep, moderately well drained, and nearly level to very gently sloping. It is in broad upland valleys. Areas are 10 to 60 acres.

Typically, the surface layer is very dark grayish brown silty clay loam about 9 inches thick. The upper part of the subsoil, to a depth of 42 inches, is very dark grayish brown clay. The lower part to a depth of 62 inches is olive brown clay.

This soil is medium in natural fertility and organic matter content. It is medium acid to neutral in the

surface layer and medium acid to moderately alkaline in the subsoil. Permeability is very slow, and available water capacity is high. The soil has fair tilth and can be worked throughout a narrow range of moisture conditions. The root zone is deep, but root penetration is moderately restricted because of the clayey subsoil.

Included in mapping are small areas of Sobol, Tamaha, and Counts soils. The included soils make up 15 percent of this map unit, but separate areas are generally less than 3 acres.

This soil has high potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate if cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has high potential for native grass and tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Stands can be maintained or improved by preventing damage by wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

This soil has low potential for most urban uses. High shrink-swell potential and wetness are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IIs, woodland group 4o, and the Loamy Savannah range site.

48—Yanush cherty silt loam, 1 to 3 percent slopes. This deep, well drained, very gently sloping soil is on upland foot slopes adjacent to the Potato Hills. Areas are 5 to 60 acres.

Typically, the surface layer is brown cherty silt loam 11 inches thick. The subsurface layer is brown cherty loam 7 inches thick. The upper part of the subsoil, to a depth of 56 inches, is red very cherty clay loam. The lower part to a depth of 72 inches is strong brown very cherty clay loam with reddish and grayish mottles.

This soil is low in natural fertility and organic matter content. It is slightly acid or medium acid in the surface layer, slightly acid to very strongly acid in the subsurface layer, and medium acid to very strongly acid in the subsoil. Permeability is moderate, and available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture conditions. The root zone is deep, but root penetration is moderately restricted because of chert fragments.

Included in mapping are similar soils, except they have more clay in the subsoil or have bedrock at a depth of less than 60 inches. Also included are a few small areas of Bigfork soils. The included soils make up about 20 percent of this map unit, but separate areas generally are less than 3 acres.

This soil has medium potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate if cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has medium potential for native grass and high potential for tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Stands can be maintained or improved by preventing damage by wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

This soil has medium potential for most urban uses. The moderate shrink-swell potential and content of chert fragments are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IIIe, woodland group 4f, and the Smooth Chert Savannah range site.

49—Yanush cherty silt loam, 3 to 8 percent slopes. This deep, well drained, gently sloping to sloping soil is on toe slopes or outwash fans, mainly on uplands adjacent to the Potato Hills. Areas are 10 to 100 acres.

Typically, the surface layer, to a depth of 7 inches, is very dark grayish brown cherty silt loam in the upper part and brown cherty silt loam in the lower part. The subsurface layer is strong brown cherty loam 5 inches thick. The upper part of the subsoil, to a depth of 50 inches, is yellowish red very cherty clay loam. The lower part of the subsoil to a depth of 62 inches is reddish brown very cherty clay loam.

This soil is low in natural fertility and organic matter content. It is slightly acid or medium acid in the surface layer, slightly acid to very strongly acid in the subsurface layer, and medium acid to very strongly acid in the subsoil. Permeability is moderate, and available water capacity is medium. Tilth is good, and the soil can be worked throughout a wide range of moisture conditions. The root zone is deep, but root penetration is moderately restricted because of chert fragments.

Included in mapping are soils that are similar to this Yanush soil, except they have bedrock at a depth of less than 60 inches or they have a more clayey subsoil. Also included are soils that are similar to this Yanush soil but

have less than 35 percent chert fragments in the subsoil. The included soils make up 15 to 20 percent of this map unit, but individual areas generally are less than 3 acres.

This soil has medium potential for row crops and small grain. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is severe if cultivated crops are grown. Minimum tillage, the use of cover crops, terracing, and contour farming help to reduce runoff and to control erosion.

This soil has medium potential for native grass and tame pasture. Bermudagrass, tall fescue, and bahiagrass are the common tame pasture plants. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

This soil has medium potential for woodland. It has no significant limitations for woodland use and management. Trees can be maintained or improved by preventing damage by wildfire or overgrazing, planting improved seedlings, removing or controlling cull trees, and selectively harvesting trees on a schedule.

This soil has medium potential for most urban uses. The moderate shrink-swell potential and content of chert fragments are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass IVe, woodland group 4f, and the Smooth Chert Savannah range site.

50—Yanush cherty silt loam, 8 to 20 percent slopes. This deep, well drained, strongly sloping to moderately steep soil is on side slopes and toe slopes, mainly on uplands adjacent to the Potato Hills. Areas are 10 to 60 acres.

Typically, the surface layer is dark brown cherty silt loam 4 inches thick. The subsurface layer is brown cherty silt loam 7 inches thick. The upper part of the subsoil, to a depth of 60 inches, is yellowish red very cherty clay loam. The lower part of the subsoil to a depth of 72 inches is brown very cherty clay loam.

This soil is low in natural fertility and organic matter content. It is slightly acid or medium acid in the surface layer, slightly acid to very strongly acid in the subsurface layer, and medium acid to very strongly acid in the subsoil. Permeability is moderate, and available water capacity is medium. The root zone is deep, but root penetration is moderately restricted because of chert fragments.

Included in mapping are small areas of Bigfork, Tuskahoma, Sobol, and Clebit soils. Also included are areas of a soil similar to the Yanush soil, except the subsoil has more clay. The included soils make up about 20 percent of this map unit, but separate areas are generally less than 4 acres.

This soil has low potential for row crops and small grain. The moderately steep slopes and the severe erosion hazard are the main limitations.

The soil is best suited to grass or woodland. It has medium potential for native grass and for tame pasture. Tall fescue, bermudagrass, and bahiagrass are the main plants used for tame pasture. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by protection from fire.

This soil has low potential for woodland. The main concerns are the erosion hazard, equipment limitations, and seedling mortality. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and preventing wildfire and overgrazing.

This soil has low potential for most urban uses. Steepness of slope is the main limitation for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This soil is in capability subclass VIe, woodland group 5f, and the Smooth Chert Savannah range site.

51—Yanush-Sobol complex, 5 to 20 percent slopes. This complex consists of areas of deep, well drained Yanush soils and moderately deep, moderately well drained Sobol soils. These soils are so intermingled in areas adjacent to the Potato Hills that they could not be separated at the scale selected for mapping. The Yanush soil is on narrow hilltops and on the upper part of side slopes, and the Sobol soil is on side slopes. Mapped areas are oblong and are 10 to 120 acres. Areas of each soil are 1/2 to 5 acres.

The Yanush soil makes up about 35 percent of each mapped area. Typically, the surface layer is dark grayish brown cherty silt loam about 5 inches thick. The subsurface layer, to a depth of 10 inches, is brown cherty loam. The upper part of the subsoil, to a depth of 20 inches, is reddish brown very cherty clay loam. The middle part, to a depth of 36 inches, is yellowish red very cherty clay loam. The lower part of the subsoil to a depth of 64 inches is strong brown very cherty clay loam.

The Yanush soil is low in natural fertility and organic matter content. It is slightly acid or medium acid in the surface layer, slightly acid to very strongly acid in the subsurface layer, and medium acid to very strongly acid in the subsoil. Permeability is moderate, and available water capacity is medium. The root zone is deep, but root penetration is moderately restricted because of chert fragments.

The Sobol soil makes up about 25 percent of each mapped area. Typically, the surface layer is dark grayish brown loam about 7 inches thick. The upper part of the

subsoil, to a depth of 11 inches, is yellowish brown clay loam. The middle part, to a depth of 19 inches, is dark yellowish brown clay. The lower part of the subsoil, to a depth of 28 inches, is grayish brown shaly clay. The underlying material to a depth of 32 inches is olive gray shale that is tilted 35 degrees from horizontal.

The Sobol soil is medium in natural fertility and organic matter content. Permeability is slow, and available water capacity is medium. The surface layer is medium acid or strongly acid. The subsoil is slightly acid to very strongly acid in the upper part and slightly acid to moderately alkaline in the lower part.

Included in mapping are areas of Tuskahoma soils and Clodine Variant soils. Also included is a soil similar to the Yanush soil, except clay or shale is at depths of 40 to 60 inches. Also included is a soil that has 20 to 40 inches of very cherty silt loam and very cherty clay loam over shale bedrock. The included soils make up about 40 percent of this complex. Individual areas are less than 5 acres.

The soils in this complex have low potential for row crops and small grain. Steep slopes and the severe erosion hazard are the main limitations.

The soils are best suited to grass or woodland. They have medium potential for native grass and low to medium potential for tame pasture. Tall fescue, bermudagrass, and bahiagrass are the main plants used for tame pasture. Fertilizing tame pasture grasses improves the quality of the grass and increases forage production, thereby protecting the soil from erosion. The quality of all grasses can be maintained or improved by using proper grazing practices and by preventing damage by fire.

The potential is low for woodland. The main concerns are the erosion hazard, equipment limitations, and seeding mortality. Trees do not grow well on the Sobol soil. The quality and quantity of forest products can be improved by removing or controlling cull trees, planting improved seedlings, selectively harvesting trees on a schedule, and protection from wildfire and overgrazing.

The potential is low for most urban uses. Slope and high shrink-swell potential are the main limitations for septic tank absorption fields, sewage lagoons, trench sanitary landfills, local roads and streets, dwellings, and small commercial buildings.

This complex is in capability subclass VIe. The Yanush part is in woodland group 5f and the Smooth Chert Savannah range site. The Sobol part is not assigned to a woodland group and is in the Loamy Prairie range site.

prime farmland

Prime farmland, as defined by the U.S. Department of Agriculture, is that land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce sustained high crop yields if acceptable farming methods are used. Prime farmland produces the highest yields with minimal inputs of energy and money and farming it results in the least damage to the environment. Prime farmland is of major importance in satisfying the nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited, and it should be used with wisdom and foresight.

Prime farmland is either currently used for producing food or fiber or is available for this use. Urban or built-up land or water areas are not included. Urban and built-up land includes any unit of land of 10 acres or more that is used for residences, industrial sites, commercial sites, construction sites, institutional sites, railroad yards, small parks, cemeteries, airports, golf courses, sanitary landfills, sewage treatment plants, water-control structures and spillways, shooting ranges, and so forth.

Prime farmland usually has an adequate and dependable supply of moisture from precipitation or irrigation. It has favorable temperature and growing season and acceptable reaction. It has few or no rocks and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods or frequently flooded during the growing season. Slope ranges mainly from 0 to 6 percent.

About 67,434 acres, or nearly 14 percent of Latimer County, meets the soil requirements for prime farmland. Most of this prime farmland is used for pasture and crops.

A recent trend in land use in some parts of the county has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, more droughty, more difficult to cultivate, and less productive.

The detailed soil map units that make up prime farmland in Latimer County are listed in this section. This list does not constitute a recommendation for a particular land use. The extent of each map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The use and management of the soils is described in the section "Detailed soil map units."

The map units that meet the soil requirements for prime farmland are:

15—Counts silt loam, 0 to 1 percent slopes
16—Counts silt loam, 1 to 3 percent slopes
20—Dela fine sandy loam [1]
22—Freestone Variant-Bernow Variant complex, 0 to 2 percent slopes
25—Neff silt loam [1]
28—Pirum fine sandy loam, 1 to 3 percent slopes
29—Pirum fine sandy loam, 3 to 5 percent slopes
31—Rexor silt loam [1]
32—Sallisaw loam, 1 to 3 percent slopes
33—Shermore fine sandy loam, 1 to 3 percent slopes
34—Shermore fine sandy loam, 3 to 5 percent slopes
36—Sobol silt loam, 2 to 5 percent slopes
38—Stigler silt loam, 0 to 1 percent slopes
39—Stigler silt loam, 1 to 3 percent slopes
40—Tamaha silt loam, 1 to 3 percent slopes
41—Tamaha silt loam, 3 to 5 percent slopes
46—Wister silt loam, 1 to 3 percent slopes
47—Woodson Variant silty clay loam, 0 to 3 percent slopes

[1] This soil qualifies as prime farmland only in areas that are flooded during the growing season less often than once in 2 years.

use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

crops and pasture

Odos G. Henson, conservation agronomist, Soil Conservation Service, helped to prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Cultivated soils in this county need management that conserves moisture, controls erosion, improves fertility, supplies organic matter, and provides good tilth. Some of the management practices are discussed below.

Soils are tilled to prepare a seedbed and to control weeds. Excessive tillage destroys tilth and speeds up decomposition of organic matter. Minimum tillage and crop residue management, therefore, are important conservation measures.

Minimum tillage is accomplished by (1) using a long term cropping system with perennial grasses or deep-rooted legumes, (2) using herbicides instead of cultivation for weed control, and (3) reducing the number of operations in preparing the seedbed, planting, and cultivating.

Leaving crop residue on the surface or working it partly into the surface protects the soil from erosion and improves the tilth of the surface layer.

Soil erosion is the main problem on cropland. If the slope is 2 percent or more, erosion is a hazard. Shermore soils, for example, have slopes of 2 percent or more. Loss of the surface layer through erosion is damaging. Productivity is reduced as the surface layer is lost. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as the Tamaha soils. Erosion also reduces productivity on soils that tend to be droughty, such as Clebit soils. Erosion on farmland results in sedimentation of streams. A conservation cropping system helps to reduce soil loss.

Soil drainage is the main management need on some of the acreage used for crops and pasture. Unless artificially drained, poorly drained soils are so wet that crops are damaged during most years. Examples of poorly drained soils are the Clodine Variant and Cupco soils.

Soil fertility is low in most of the uplands. Most plants respond to fertiliizer and lime. Some of the field crops suited to the survey area are wheat, grain sorghum, and soybeans.

tame pasture plants

The major tame pasture plants and general guidelines for managing soils for those plants are described in this section. Information about management for specific soils is in the section "Soil maps for detailed planning."

Much of the acreage in the county is in tame pasture plants. The trend is to convert cropland and woodland to pasture and, to a lesser degree, rangeland to pasture.

The main grass is improved bermudagrass. Some of the better pastures of bermudagrass are overseeded with legumes, which provide additional plant food that increases the quality and quantity of forage.

Some bermudagrass pastures are overseeded with fescue. This grass mixture is especially adapted to soils on flood plains where additional moisture is available. It provides grazing in nearly all months and furnishes added protein for livestock during the months when bermudagrass is dormant.

Fescue is an important grass in the county. It provides a sufficient quantity of forage for grazing on soils that have large amounts of available moisture. Fescue is used in the pasture program with other forages to furnish grazing and additional protein late in fall and early in spring. To maintain a vigorous stand, fescue needs to be fertilized early in spring and early in fall, and it should not be grazed during summer.

Bahiagrass, a deep-rooted, warm-season perennial grass, is adapted to soils in the county. It is better adapted to soils that have low fertility than most perennial summer grasses. It is best adapted to deep, well drained loamy or sandy soils. Bahiagrass can be grazed about the same time of year as bermudagrass.

Weeping lovegrass is grown to a limited extent in the county. It is a warm-season perennial bunchgrass suited to well drained loamy and sandy soils. It begins growth earlier in spring and remains green later in fall than bermudagrass. It becomes less palatable to cattle as it matures and responds well to fertilizer, especially nitrogen.

Some areas of cropland are used for forage plants that supplement the permanent grasses. Small grains in the pasture program provide grazing and additional protein for livestock late in fall and early in spring. They need to be seeded and fertilized late in summer or early in fall in order to obtain the maximum amount of forage. Small grains can be grazed until maturity, or livestock can be removed in spring to allow the plants to grow a seed crop for harvest. Wheat, oats, and rye are the main small grains used for grazing.

Sudangrass, an annual grass, is also used in some areas to supplement permanent grasses. It provides grazing during summer, or the forage can be harvested for hay. In some areas sudangrass is allowed to grow until frost and is grazed in winter. Fertilizer should be used for maximum growth.

The kinds of soil and suitable plants are concerns in good tame pasture management. Good pasture can be achieved by maintaining the desired kind and stand of plants. Plants must have vigor to keep a proper balance in the stand. Grazing needs to be compatible with the growth and vigor of pasture plants.

Proper grazing and rotation grazing help to lengthen the life of most tame pasture plants. Deferred grazing is beneficial during the time that tame pasture plants are under the most stress. It allows plants to regain vigor by helping to maintain a large root system where food can be stored for the next growing season. The total production of forage is thus increased.

A fertilizer program that contributes the proper nutrient elements insures vigorous pasture plants. Fertilization increases forage production and lengthens the lifespan of the plants. Plant nutrients can be added by growing legumes that furnish nitrogen to the plants. The acidity of the soil needs to be adjusted to the kinds of plants desired in the stand. Large amounts of plant nutrients, especially nitrogen, are needed where legumes are not grown with the grass.

The desirable pasture plants can be maintained in the stand only by controlling the invasion of undesirable plants. Weeds need to be controlled. Brush control is commonly needed on soils on which trees grow. Mowing or spraying helps to reduce weeds and brush.

A planned pasture program helps provide forage during each month of the year. A study of the growth habits of the different plants assures adequate forage each month. The months that various kinds of forage plants grow are indicated in figure 6. The percentage of growth for each kind of plant is also indicated. For example, bermudagrass makes about 23 percent of its yearly growth for grazing during the month of June.

Soils vary in their capacity to produce forage for grazing. Stigler soils, for example, produce more forage than Sobol soils mainly because Stigler soils furnish more available moisture for plants.

The total yearly production per acre of various kinds of pasture plants on each soil is given in animal-unit-months (AUM) in table 5. An animal unit is generally one mature cow of approximately 1,000 pounds and a calf as old as 6 months, or their equivalent. An animal-unit-month (AUM) is the amount of forage required by an animal unit for one month. An acre of improved bermudagrass on Wister silt loam, 1 to 3 percent slopes, for example, furnishes grazing for one animal unit for 7 months.

In planning a pasture program, one must consider the total yearly production of the pasture plant in AUM and the growth the plant makes each month. Figure 6 shows that bermudagrass furnished 23 percent of its annual forage during June. An acre of Wister silt loam, 1 to 3 percent slopes, provides grazing for 1.6 animal units during June because its yearly production is 7 AUM (23 percent of 7 AUM equals 1.6 AUM). Therefore, a 50-acre pasture would furnish grazing for 80 animal units (50 acres times 1.6 AUM equals 80 AUM) during June. Personnel at the local office of the Soil Conservation Service or at the

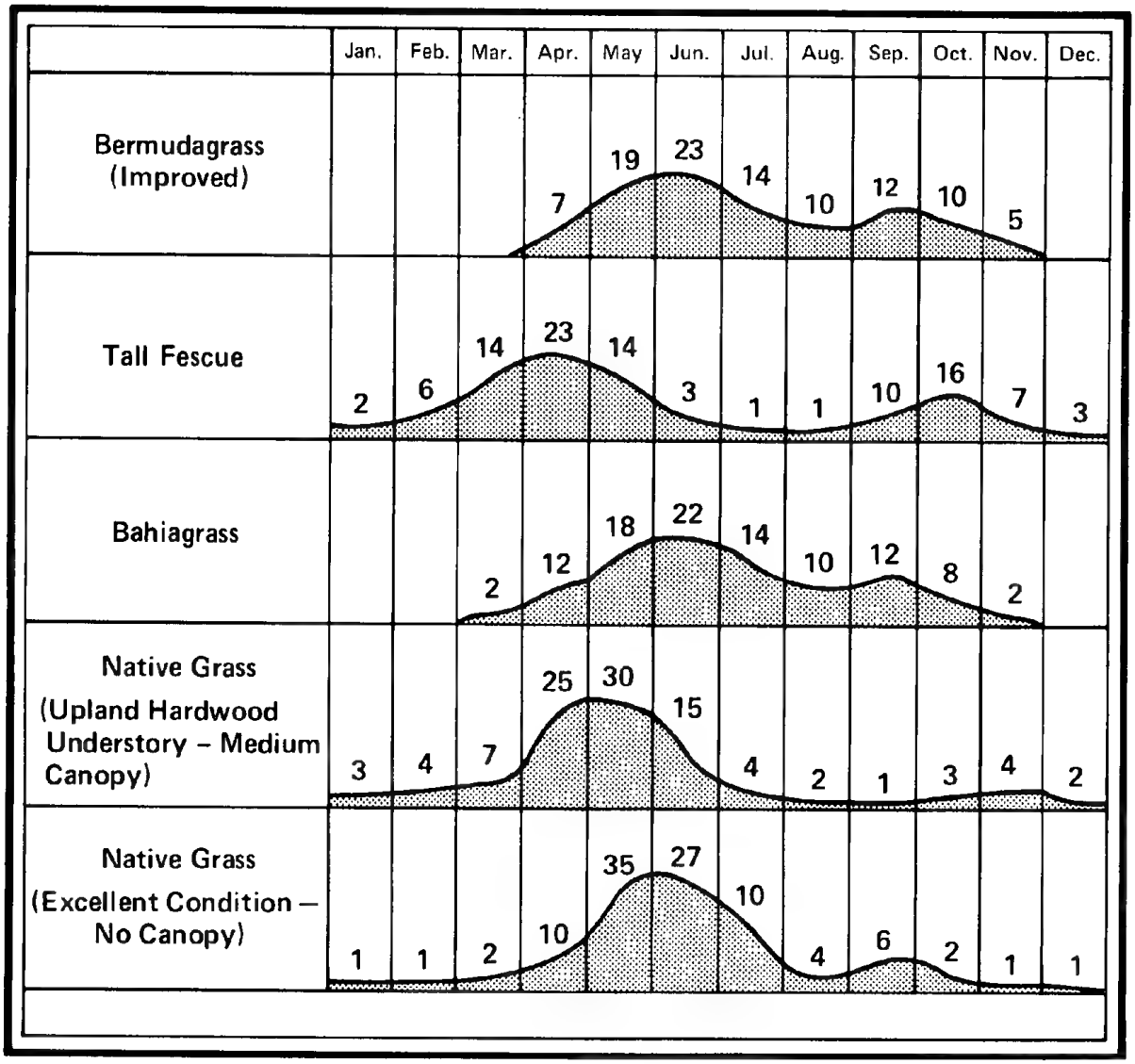


Figure 6.—Forage calendar showing monthly growth as a percentage of the forage produced annually.

county extension office can help plan a pasture program for your farm.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely

to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils.

land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed soil map units."

rangeland

Ernest C. Snook, range conservationist, Soil Conservation Service, helped prepare this section.

Rangeland in Latimer County is used primarily for livestock production. Beef cow-calf and steer operations are dominant. About 5 percent of the county is open rangeland (fig. 7). A large acreage of the woodland and associated savannahs are producing native plants that are used for livestock forage.

On many ranches the native forage produced on rangeland is supplemented by feed or forage produced from other land uses. In winter the native forage is often supplemented with protein concentrate. Calves and yearlings are creep fed to increase market weight on some ranches.

The native vegetation in many parts of the survey area has been greatly depleted by continued excessive use. Brush and weeds cover much of the acreage that was once open grassland. The amount of forage currently produced may be less than half of that originally produced. Productivity of the range can be increased if management is tailored to the kind of soil and range site.

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 6 shows, for each soil, the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. Only those soils that are used as or are suited to rangeland are listed. Explanation of the column headings in table 6 follows.

A *range site* is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. The relationship between soils and vegetation was established during this survey; thus, range sites generally

Figure 7.—Beef cattle grazing native rangeland. The soil is Stigler silt loam, 1 to 3 percent slopes, and the range site is Loamy Savannah.

can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre reduced to a common percent of air-dry moisture.

Characteristic vegetation—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential

community, the better the range condition. Range condition is an ecological rating only. It does not have a specific meaning that pertains to the present plant community in a given use.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, reduction of undesirable brush species, conservation of water, and control of water erosion and soil blowing. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

woodland management and productivity

Norman E. Smola, forester, Soil Conservation Service, helped prepare this section.

Approximately 70 percent of Latimer County is forested, mainly in oak-pine and oak-hickory forest types. Shortleaf pine is the principal commercial species (fig. 8). The oak-pine type makes up about 70 percent of the forested area, and the oak-hickory type about 30 percent.

Even though the present value of wood products is substantial, the woodlands are not developed or managed to near their potential. Other woodland benefits are grazing, wildlife habitat, recreation, esthetics, and soil and water conservation.

Figure 8.—Native shortleaf pine on an area of Carnasaw-Pirum-Clebit association, strongly sloping. The undesirable trees have been cut down to allow faster growth of pines.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, t, d, c, s, and f.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. Site index was determined at age 30 years for eastern cottonwood, 35 years for American sycamore, and 50 years for all other species. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

woodland understory vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. Some woodland, if well managed, can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive.

Table 8 shows, for each soil suitable for woodland use, the potential for producing understory vegetation. The total production of understory vegetation includes the herbaceous plants and the leaves, twigs, and fruit of woody plants up to a height of 4 1/2 feet. It is expressed in pounds per acre of air-dry vegetation in favorable, normal, and unfavorable years. In a favorable year, soil moisture is above average during the optimum part of the growing season; in a normal year, soil moisture is average; and in an unfavorable year, it is below average.

Table 8 also lists the common names of the characteristic vegetation on each soil and the percentage composition, by air-dry weight, of each kind of plant. The table shows the kind and percentage of understory plants expected under a canopy density that is most nearly typical of woodland in which the production of wood crops is highest.

recreation

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil

properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

wildlife habitat

Billy M. Teels, biologist, Soil Conservation Service, helped prepare this section.

Wildlife is abundant throughout the county. Bobwhite quail, dove, rabbit, squirrel, and deer are in all areas. Wild turkey have been reintroduced into the area and are most abundant in the southern part of the county. Other animals common to most of the area are coyote, bobcat, raccoon, opossum, grey fox, and beaver. Ducks are common during spring.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features

that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, lespedeza, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, and ragweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, mulberry, cherry, apple, hawthorn, dogwood, hickory, blackberry, and persimmon. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse, seeds, and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, shore birds, muskrat, mink, and beaver.

engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5)

plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

building site development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

sanitary facilities

Table 12 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is

evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

construction materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

water management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment

can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 20.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 20.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

physical and chemical properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 16, the estimated content of organic matter of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the

soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

soil and water features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes are not considered flooding.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Only saturated zones within a depth of about 6 feet are indicated. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class,

total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

physical and chemical analyses of selected soils

The results of physical analysis of several representative pedons in the survey area are given in table 18 and the results of chemical analysis in table 19. The data are for soils sampled at carefully selected sites. The pedon for the Cupco soil is typical of the series and is described in the section "Soil series and their morphology." The other soils are taxadjuncts to the named series; however, the soil behavior is the same as the named series. Soil samples were analyzed by the Soil Morphology, Genesis and Classification Laboratory, Department of Agronomy, Oklahoma State University.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an oven-dry basis. The methods used in obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods (*4*).

Sand—(0.05-2.0 mm fraction) weight percentages of materials less than 2 mm (3A1).

Silt—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all materials less than 2 mm (3A1).

Clay—(fraction less than 0.002 mm) pipette extraction, weight percentages of materials less than 2 mm (3A1).

Organic matter—peroxide digestion (6A3).

Extractable cations—ammonium acetate pH 7.0, uncorrected; calcium (6N2), magnesium (602), sodium (6P2), potassium (6Q2).

Cation-exchange capacity—sum of cations (5A3a).

Base saturation—sum of cations, TEA, pH 8.2 (5C3).

Reaction (pH)—1:1 water dilution (8C1a).

Total phosphorus—perchloric acid; colorimetry (6S1a).

engineering index test data

Table 20 shows laboratory test data for four pedons sampled at carefully selected sites in the survey area. The pedons are taxadjuncts to the named series; however, the soil behavior is the same as in the named series. The soil samples were tested by Oklahoma State Department of Transportation, Materials Division.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); Shrinkage—T 92 (AASHTO), D 427 (ASTM).

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*5*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 21, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquents (*Hapl*, meaning minimal horizonation, plus *aquent*, the suborder of the Entisols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, nonacid, mesic Typic Haplaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

soil series and their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*3*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*5*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Bengal series

The Bengal series consists of moderately deep, well drained, slowly permeable soils that formed in colluvium and material weathered from shale. These gently sloping to moderately steep soils are on erosional foothills in the southern part of the county.

Bengal soils are associated with Carnasaw, Clebit, and Denman soils. Carnasaw soils are similar to Bengal soils but have a thicker solum. The shallow Clebit soils formed in material weathered from sandstone. Denman soils are deeper and have a thicker stony loam surface layer.

The soils of the Bengal series are clayey, mixed, thermic Typic Hapludults.

Typical pedon of Bengal stony loam in an area of Bengal-Denman association, moderately steep, 1,800 feet west and 1,200 feet north of the southeast corner of sec. 26, T. 5 N., R. 20 E.

A11—0 to 3 inches; dark brown (10YR 3/3) stony loam; weak fine granular structure; friable; sandstone fragments make up 30 percent by volume; medium acid; gradual wavy boundary.
A12—3 to 7 inches; brown (10YR 4/3) stony loam; weak fine granular structure; friable; sandstone fragments make up 30 percent by volume; strongly acid; gradual wavy boundary.
B21t—7 to 10 inches; strong brown (7.5YR 5/6) stony clay loam; weak medium subangular blocky structure; friable; patchy clay films on faces of peds; sandstone fragments make up 15 percent by volume; strongly acid; gradual smooth boundary.
IIB22t—10 to 22 inches; yellowish red (5YR 4/8) clay; common medium distinct strong brown (7.5YR 5/6) and pale brown (10YR 6/3) mottles; moderate medium blocky structure; very firm; patchy clay films on faces of peds; very strongly acid; diffuse wavy boundary.
IIB3—22 to 29 inches; gray (10YR 6/1) shaly clay; many medium and coarse distinct yellowish red (5YR 5/6), yellowish brown (10YR 5/6), and light olive brown (2.5YR 5/6) mottles; weak coarse blocky structure; very firm; few patchy clay films on faces of peds; shale fragments make up 15 percent by volume; strongly acid; diffuse irregular boundary.
IICr—29 to 36 inches; olive gray (5Y 4/2) shale tilted 30 degrees from horizontal; slightly acid.

Solum thickness ranges from 20 to 40 inches. Depth to shale bedrock ranges from 20 to 50 inches.

The A11 horizon is 3 to 8 inches thick. It has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Sandstone fragments make up 10 to 50 percent by volume. Reaction is medium acid or strongly acid.

The A12 horizon is 0 to 9 inches thick. It has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is similar to the A11 horizon in texture and content of coarse fragments. Reaction is strongly acid or very strongly acid.

The B21t horizon is 0 to 6 inches thick. It has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is stony clay loam, stony sandy clay loam, gravelly clay loam, gravelly sandy clay loam, sandy clay loam, or clay loam. Sandstone fragments make up 10 to 30 percent by volume. Reaction is strongly acid or very strongly acid.

The IIB22t horizon is 8 to 24 inches thick. It has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 8. Most pedons have mottles in shades of red, brown, and gray. The gray colors are inherited from the parent material and do not indicate wetness. Texture is clay or silty clay. Sandstone and shale fragments make up as much as 10 percent by volume. Reaction is strongly acid or strongly acid.

The IIB3 horizon is 6 to 12 inches thick. It has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 to 6 and is mottled in shades of red, brown, and gray. In some pedons it is coarsely mottled in shades of red, brown, and gray. Texture is shaly clay, shaly silty clay, clay, or silty clay. Reaction is strongly acid or very strongly acid. Shale fragments make up 5 to 30 percent by volume.

Some pedons have a IIC horizon that is 3 to 12 inches thick. This horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 to 3. Texture is clay, silty clay, shaly clay, or shaly silty clay. Shale fragments make up 5 to 30 percent by volume. Reaction is slightly acid to strongly acid.

The IICr horizon is grayish or olive shale that is tilted more than 20 degrees from horizontal. Reaction is neutral to medium acid.

Bernow Variant

The Bernow Variant consists of deep, moderately well drained, moderately slowly permeable soils that formed in loamy alluvial sediments. These nearly level soils are on terraces or fans of local outwash material from the adjacent mountains and are variants to the Bernow series because they have a water table at 3 to 4 feet for a significant period of the year. They occur on mounds and are moderately slowly permeable.

Bernow Variant soils are associated with Ceda, Freestone Variant, Sallisaw, and Wister soils. Ceda soils have more than 35 percent coarse fragments and are on flood plains. Freestone Variant soils are somewhat poorly drained and are in the lower areas of the landscape. Wister soils have more clay in the control section.

Bernow Variant soils are fine-loamy, siliceous, thermic Glossic Paleudalfs.

Typical pedon of Bernow Variant fine sandy loam in an area of Freestone Variant-Bernow Variant complex, 0 to 2 percent slopes, 100 feet east and 600 feet south of the northwest corner of sec. 16, T. 3 N., R. 21 E.

A1—0 to 10 inches; dark brown (10YR 4/3) fine sandy loam; weak medium granular structure; friable; medium acid; clear smooth boundary.
A2—10 to 17 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak medium subangular blocky structure; friable; medium acid; gradual wavy boundary.
B21t—17 to 36 inches; yellowish brown (10YR 5/6) clay loam; few medium distinct yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; firm; common discontinuous clay films on faces of peds; very strongly acid; diffuse wavy boundary.
B22t—36 to 48 inches; yellowish brown (10YR 5/6) clay loam; many medium distinct strong brown (7.5YR 5/6), yellowish red (5YR 5/6), and gray (10YR 6/1) mottles; moderate medium subangular blocky

structure; firm; common discontinuous clay films on faces of peds; 5 percent by volume of clean sand grains; very strongly acid; diffuse wavy boundary.
B3—48 to 72 inches; coarsely mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and gray (10YR 6/1) sandy clay loam; moderate coarse subangular blocky structure; firm; 5 percent by volume of clean sand grains; very strongly acid.

Solum thickness and depth to bedrock are more than 60 inches.

The A1 horizon is 7 to 19 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Reaction is slightly acid to very strongly acid.

The A2 horizon is 4 to 8 inches thick. It has hue of 10YR, value of 4 or 6, and chroma of 3 to 6. It is fine sandy loam or loam. Reaction is slightly acid to very strongly acid.

Some pedons have a B1 horizon, which is 0 to 8 inches thick. It is similar to the A2 horizon in color and reaction. Texture is loam, sandy clay loam, or clay loam.

The B21t horizon is 23 to 54 inches thick. It has hue of 10YR, value of 5 or 6, and chroma of 3 to 6. It has many or common medium or coarse mottles in shades of red, brown, and gray in the lower part. It is clay loam or sandy clay loam. Clean sand grains make up 0 to 10 percent by volume. Reaction is medium acid to very strongly acid.

The B3 horizon is 14 to 32 inches thick. It has hue of 7.5YR or 10YR, value of 5 to 6, and chroma of 1 to 6. Most pedons are coarsely mottled in shades of red, brown, and gray. Clean sand grains make up 5 to 10 percent by volume. Texture is sandy clay loam or clay loam. Reaction is medium acid to very strongly acid.

Bigfork series

The Bigfork series consists of moderately deep, well drained, moderately permeable soils that formed in material weathered from chert. These soils are on the steep upper part of side slopes and on ridge crests of the Potato Hills in the southern part of the county.

Bigfork soils are associated with Yanush soils. Yanush soils are on the lower part of slopes. They formed in colluvial materials and have a thicker solum than Bigfork soils.

The soils of the Bigfork series are loamy-skeletal, siliceous, thermic Typic Hapludults.

Typical pedon of Bigfork stony silt loam in an area of Bigfork-Yanush association, steep, 1,300 feet east and 1,800 feet south of the northwest corner of sec. 33, T. 3 N., R. 21 E.

A1—0 to 7 inches; dark grayish brown (10YR 4/2) stony silt loam; moderate medium granular structure; very friable; many roots; fragments of chert make up about 45 percent by volume; slightly acid; gradual wavy boundary.
A2—7 to 13 inches; yellowish brown (10YR 5/4) very cherty silt loam; weak medium granular structure; friable; common roots; fragments of chert make up 55 percent by volume; strongly acid; gradual wavy boundary.
B2t—13 to 28 inches; strong brown (7.5YR 5/6) very cherty clay loam; moderate medium subangular blocky structure; friable; few patchy clay films on faces of peds; fragments of chert make up 75 percent by volume; very strongly acid; diffuse wavy boundary.
R—28 to 36 inches; hard, multicolored chert interbedded with thin strata of shale and sandstone and tilted 30 degrees from horizontal.

Solum thickness is 20 to 40 inches.

The A horizon is 4 to 12 inches thick. It has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 6. Texture is very cherty loam or very cherty silt loam. Fragments of chert make up 35 to 85 percent by volume. Reaction is medium acid or strongly acid.

The B2t horizon is 12 to 30 inches thick. It has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. Fragments of chert make up 35 to 85 percent by volume. Texture is very cherty clay loam or very cherty silty clay loam. Reaction is medium acid to very strongly acid.

The R layer is multicolored chert beds interbedded with thin strata of shale and sandstone. Beds are tilted more than 20 degrees from horizontal.

Carnasaw series

The Carnasaw series consists of deep, well drained, slowly permeable soils that formed in colluvium and material weathered from shale. These gently sloping to steep soils are on side slopes of mountains throughout the county.

Carnasaw soils are associated with Bengal, Clebit, and Denman soils. Bengal soils have a solum 20 to 40 inches thick over shale. Clebit soils have a solum 10 to 20 inches thick over sandstone bedrock. Denman soils have a fine-loamy over clayey control section.

The soils of the Carnasaw series are clayey, mixed, thermic Typic Hapludults.

Typical pedon of Carnasaw stony fine sandy loam in an area of Carnasaw-Clebit association, moderately steep, 2,600 feet east and 2,400 feet north of the southwest corner of sec. 16, T. 3 N., R. 19 E.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) stony fine sandy loam; weak medium granular structure; friable; many fine and medium roots; sandstone fragments make up 25 percent by volume; medium acid; clear wavy boundary.
A2—4 to 9 inches; yellowish brown (10YR 5/4) stony fine sandy loam; weak medium granular structure; friable; many fine and medium roots; sandstone

fragments make up 20 percent by volume; medium acid; clear wavy boundary.
B1—9 to 13 inches; strong brown (7.5YR 5/6) loam; moderate fine subangular blocky structure; friable; many fine and medium roots; sandstone fragments make up 5 percent by volume; very strongly acid; clear wavy boundary.
B21t—13 to 29 inches; red (2.5YR 4/6) clay; many fine distinct strong brown (7.5YR 5/6) and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm; common fine and medium roots; common clay films on faces of peds; few sandstone fragments; very strongly acid; gradual wavy boundary.
B22t—29 to 37 inches; yellowish red (5YR 4/8) clay; many fine distinct red (2.5YR 4/6), strong brown (7.5YR 5/6), and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm; common fine and medium roots; common clay films on faces of peds; few sandstone fragments; very strongly acid; gradual wavy boundary.
B3—37 to 46 inches; coarsely mottled red (2.5YR 4/8), yellowish brown (10YR 5/6), pale brown (10YR 6/3), and gray (10YR 6/1) clay; weak coarse subangular blocky structure; firm; few fine and medium roots; shale fragments make up 10 percent by volume; very strongly acid; gradual irregular boundary.
Cr—46 to 55 inches; dark grayish brown (2.5Y 4/2) fractured shale that is tilted 40 degrees from horizontal.

Solum thickness and depth to shale bedrock range from 40 to 60 inches.

The A1 horizon is 2 to 6 inches thick. It has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 or 3. Sandstone fragments make up 10 to 30 percent by volume. Reaction is medium acid or strongly acid.

The A2 horizon is 3 to 8 inches thick. It has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. The texture, reaction, and content of coarse fragments of sandstone are the same as in the A1 horizon.

The B1 horizon is 0 to 6 inches thick. It has hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6. Texture is loam or clay loam. Sandstone fragments make up 0 to 15 percent by volume. Reaction is strongly acid or very strongly acid.

The B21t horizon is 7 to 20 inches thick. It has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 6 to 8. Texture is clay or silty clay. Some pedons have brown mottles. Sandstone fragments make up 2 to 10 percent by volume. Reaction is strongly acid or very strongly acid.

The B22t horizon is 8 to 25 inches thick. It has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. Texture is clay or silty clay. This horizon is mottled in shades of red, brown, or yellow. Sandstone fragments make up 2 to 10 percent by volume. Reaction is strongly acid or very strongly acid.

The B3 horizon is 5 to 20 inches thick. It is coarsely mottled in shades of red, brown, and gray. Texture is clay, silty clay, shaly clay, or shaly silty clay. Shale fragments make up 5 to 25 percent by volume. Reaction is strongly acid or very strongly acid.

The Cr horizon is fractured shale that is tilted more than 20 degrees from horizontal.

Ceda series

The Ceda series consists of deep, well drained, rapidly permeable soils that formed in loamy alluvium. These nearly level to very gently sloping soils are on flood plains along streams that drain mountains.

Ceda soils are associated with Bengal, Carnasaw, Clebit, Denman, Dela, and Kenn soils. Bengal, Carnasaw, and Denman soils have an argillic horizon and are on uplands. Clebit soils are on uplands and have a solum 10 to 20 inches thick over sandstone bedrock. Dela and Kenn soils are on flood plains and have less than 35 percent coarse fragments in the control section.

The soils of the Ceda series are loamy-skeletal, siliceous, nonacid, thermic Typic Udifluvents.

Typical pedon of Ceda very gravelly fine sandy loam in an area of Ceda-Rubble land complex, 1,900 feet south and 800 feet west of the northeast corner of sec. 14, T. 4 N., R. 21 E.

A1—0 to 7 inches; brown (10YR 4/3) very gravelly fine sandy loam; weak fine and medium granular structure; very friable; quartz and sandstone fragments make up 45 percent by volume; medium acid; clear wavy boundary.
C—7 to 72 inches; brown (10YR 5/3) very gravelly fine sandy loam; massive; friable; fragments of sandstone make up 60 percent by volume; common thin strata with bedding planes; medium acid.

The A horizon is 5 to 18 inches thick. It has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. Fragments of sandstone make up 35 to 50 percent by volume. Reaction is slightly acid or medium acid.

The C horizon is 44 to 60 inches thick. It has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. Texture is very gravelly loam, very gravelly silt loam, very gravelly fine sandy loam, or very gravelly clay loam. Fragments of sandstone make up 35 to 85 percent by volume. Reaction is slightly acid or medium acid.

Clebit series

The Clebit series consists of shallow, well drained, moderately rapidly permeable soils that formed in material weathered from sandstone. These gently sloping to steep soils are on side slopes, ridgetops, and ridge crests.

Clebit soils are associated with Bengal, Carnasaw, Denman, and Pirum soils. All the associated soils have

an argillic horizon. Bengal soils are moderately deep to shale. Carnasaw and Denman soils are deep to shale. Pirum soils are moderately deep to sandstone.

The soils of the Clebit series are loamy-skeletal, siliceous, thermic Lithic Dystrochrepts.

Typical pedon of Clebit stony fine sandy loam in an area of Carnasaw-Clebit association, moderately steep, 2,600 feet east and 2,500 feet north of the southwest corner of sec. 16, T. 3 N., R. 19 E.

A11—0 to 3 inches; very dark grayish brown (10YR 3/2) stony fine sandy loam; moderate medium granular structure; friable; many fine and medium roots; fragments of sandstone make up 50 percent by volume; medium acid; clear wavy boundary.

A12—3 to 6 inches; brown (10YR 5/3) stony fine sandy loam; weak medium granular structure; friable; many fine and medium roots; fragments of sandstone make up 50 percent by volume; medium acid; clear wavy boundary.

B2—6 to 12 inches; yellowish brown (10YR 5/6) stony loam; weak medium subangular blocky structure; friable; many fine and medium roots; fragments of sandstone make up 50 percent by volume; very strongly acid; clear irregular boundary.

R—12 to 20 inches; hard sandstone that is tilted 40 degrees from horizontal.

Solum thickness and depth to hard sandstone bedrock range from 10 to 20 inches.

The A horizon is 2 to 10 inches thick. It has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. Fragments of sandstone make up 35 to 70 percent by volume. Reaction is slightly acid to strongly acid.

The B2 horizon is 6 to 14 inches thick. It has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. Some pedons have mottles in shades of red, brown, or yellow. Texture is stony loam, stony fine sandy loam, very gravelly loam, or very gravelly fine sandy loam. Fragments of sandstone make up 35 to 75 percent by volume. Reaction is slightly acid to very strongly acid.

The R layer is hard sandstone that is tilted more than 20 degrees from horizontal.

Clodine Variant

The Clodine Variant consists of deep, poorly drained, moderately permeable soils that formed in cherty outwash material. These nearly level to gently sloping soils are on outwash fans or terraces. They are variants to the Clodine series because they have a loamy-skeletal control section, do not have calcium carbonate concretions, and have a higher clay content in the solum.

Clodine Variant soils are associated with the Sobol, Tuskahoma, Wilburton Variant, Wister, and Yanush soils, all which are better drained and are on higher parts of the landscape. Also, Sobol, Tuskahoma, and Wister soils have more clay in the control section, and the Wilburton Variant soils have less than 35 percent coarse fragments.

The Clodine Variant soils are loamy-skeletal, siliceous, thermic Typic Ochraqualfs.

Typical pedon of Clodine Variant cherty silt loam in an area of Clodine Variant-Wilburton Variant complex, 0 to 3 percent slopes, 2,600 feet south and 400 feet east of the northwest corner of sec. 24, T. 3 N., R. 19 E.

A1—0 to 6 inches; grayish brown (10YR 5/2) cherty silt loam; many fine distinct yellowish brown (10YR 5/6) and dark brown (10YR 3/3) mottles; weak medium granular structure; friable; chert fragments make up 15 percent by volume; common black concretions; medium acid; gradual smooth boundary.

A2—6 to 14 inches; light brownish gray (10YR 6/2) cherty silt loam; many fine distinct yellowish brown (10YR 5/6) and dark brown (10YR 3/3) mottles; weak medium granular structure; firm; chert fragments make up 20 percent by volume; common black concretions; very strongly acid; gradual smooth boundary.

B21t—14 to 32 inches; dark gray (10YR 4/1) very cherty silty clay loam; many fine distinct pale brown (10YR 6/3), yellowish brown (10YR 5/6), and dark brown (10YR 3/3) mottles; weak medium subangular blocky structure; very firm; clay films on faces of peds; chert fragments make up 40 percent by volume; common black concretions; medium acid; diffuse wavy boundary.

B22t—32 to 44 inches; dark grayish brown (10YR 4/2) very cherty silty clay loam; many fine and medium dark gray (10YR 4/1), light brownish gray (10YR 6/2), and dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; very firm; patchy clay films on faces of peds; chert fragments make up 60 percent by volume; medium acid; diffuse wavy boundary.

B3—44 to 65 inches; variegated dark gray (10YR 4/1), yellowish brown (10YR 5/6), and pale brown (10YR 6/3) very cherty clay loam; weak fine subangular blocky structure; very firm; chert fragments make up 75 percent by volume; slightly acid.

Solum thickness is more than 60 inches.

The A1 horizon is 5 to 8 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 2. Chert fragments make up 15 to 35 percent by volume. Reaction is slightly acid to strongly acid.

The A2 horizon is 4 to 10 inches thick. It has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Chert fragments make up 15 to 35 percent by volume. Reaction is medium acid to very strongly acid.

The B21t horizon is 10 to 24 inches thick. It has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. Mottles are in shades of yellow, brown, or gray. Texture is very cherty silty clay loam or very cherty clay loam.

Chert fragments make up 35 to 75 percent by volume. Reaction is medium acid to very strongly acid.

The B22t horizon is 10 to 20 inches thick. It has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. Mottles are in shades of gray, yellow, and brown, or they are variegated in these colors. Texture is very cherty silty clay loam or very cherty clay loam. Chert fragments make up 35 to 85 percent by volume. Reaction is medium acid to very strongly acid.

Counts series

The Counts series consists of deep, moderately well drained, very slowly permeable soils that formed in material weathered from shale or from clayey sediments (fig. 9). These nearly level to strongly sloping soils are on broad valley floors in savannah areas.

Counts soils are associated with Sobol, Stigler, Tamaha, and Wing soils. Sobol soils have a solum less than 40 inches thick. Stigler soils have a thicker A horizon, and Tamaha soils do not have an abrupt textural change between the A and B horizons. Wing soils have a high percentage of sodium in the subsoil.

The soils of the Counts series are fine, mixed, thermic Albaquic Paleudalfs.

Typical pedon of Counts silt loam, 1 to 3 percent slopes, 2,300 feet west and 1,500 feet south of the northeast corner of sec. 17, T. 5 N., R. 19 E.

A1—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; few dark brown concretions; medium acid; gradual wavy boundary.

A2—8 to 13 inches; grayish brown (10YR 5/2) silt loam; few fine faint brown mottles; weak medium granular structure; friable; few dark brown concretions; strongly acid; clear wavy boundary.

B21t—13 to 28 inches; yellowish brown (10YR 5/4) clay; many medium faint brown (10YR 4/3) and few fine distinct grayish brown (10YR 5/2) mottles; moderate medium blocky structure; very firm; clay films on faces of peds; few dark brown and black concretions; medium acid; diffuse wavy boundary.

B22t—28 to 46 inches; yellowish brown (10YR 5/6) clay; many medium distinct dark yellowish brown (10YR 4/4) and light brownish gray (10YR 6/2) mottles; moderate medium blocky structure; very firm; clay films on faces of peds; few dark brown and black concretions; medium acid; diffuse wavy boundary.

B23t—46 to 65 inches; coarsely mottled gray (10YR 7/1), yellowish brown (10YR 5/6), and brownish yellow (10YR 6/6) clay; weak coarse blocky structure; very firm; few patchy clay films on faces of peds; few dark brown concretions and black streaks; few fragments of shale; slightly acid.

Thickness of the solum and depth to shale are more than 60 inches. The combined thickness of the A horizons is less than 16 inches.

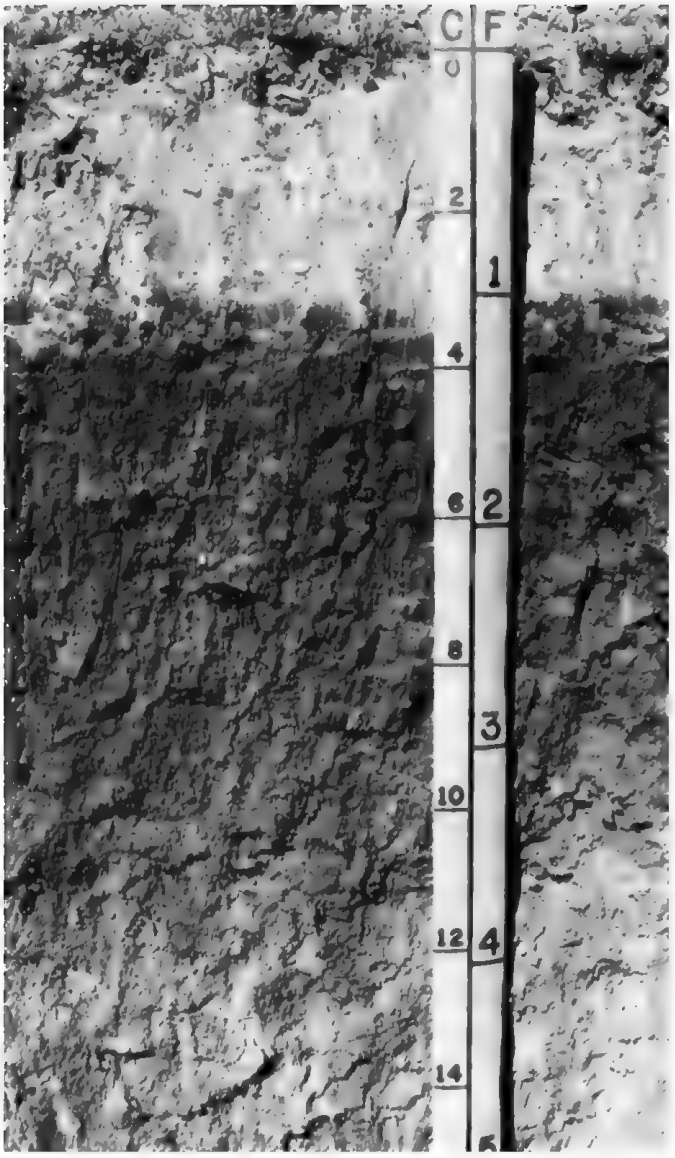


Figure 9.—Dry profile of Counts silt loam, 0 to 1 percent slopes. Depth is shown in centimeters (C) and feet (F). Multiply the figure on the left by 10 to determine the depth in centimeters.

The A1 horizon is 5 to 8 inches thick. It has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. It is medium acid or strongly acid.

The A2 horizon is 4 to 10 inches thick. It has hue of 10YR, value of 5, and chroma of 2 or 3. It is silt loam or loam. Reaction is strongly acid or very strongly acid.

The B21t and B22t horizons are 33 to 59 inches thick. They have hue of 10YR, value of 4 to 6, and chroma of 3 to 6. They contain mottles in shades of gray, brown, and yellow, or they are coarsely mottled in shades of brown, yellow, and gray. Texture is clay, silty clay, clay

loam, or silty clay loam. Reaction is medium acid to very strongly acid.

The B23t horizon is 16 to 30 inches thick. The B23t horizon is similar in color, mottling, and texture to the B21t and B22t horizons. Most pedons are coarsely mottled in shades of gray, yellow, red, and brown. Reaction is medium acid to moderately alkaline.

Cupco series

The Cupco series consists of deep, somewhat poorly drained, moderately slowly permeable soils that formed in loamy alluvial sediments. These nearly level soils are on flood plains of major streams.

Cupco soils are associated with Neff and Rexor soils. Neff and Rexor soils are better drained and are on higher positions on the landscape.

The soils of the Cupco series are fine-silty, siliceous, thermic Aeric Ochraqualfs.

Typical pedon of Cupco silt loam, 600 feet north and 1,200 feet west of the southeast corner of sec. 15, T. 5 N., R. 21 E.

A11—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; few fine faint light brownish gray and brown mottles; weak medium granular structure; friable; many fine and medium roots; very strongly acid; clear smooth boundary.

A12—8 to 14 inches; brown (10YR 5/3) silt loam; common medium faint light brownish gray (10YR 6/2) and few medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium granular structure; friable; common fine and medium roots; few fine and medium black concretions; very strongly acid; clear smooth boundary.

A2—14 to 20 inches; gray (10YR 6/1) silt loam; common fine and medium distinct yellowish brown (10YR 5/6) and many medium faint brown (10YR 5/3) mottles; weak medium granular structure; friable; common fine roots; common medium black concretions; very strongly acid; clear wavy boundary.

B21t—20 to 35 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine and medium distinct yellowish brown (10YR 5/6) and many medium faint brown (10YR 5/3) mottles; moderate medium subangular blocky structure; very firm; common fine roots; common clay films on faces of peds; common fine black concretions; very strongly acid; gradual wavy boundary.

B22t—35 to 57 inches; brown (10YR 4/3) silty clay loam; common medium faint grayish brown (10YR 5/2) and common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few fine roots; dark grayish brown (10YR 4/2) coatings on faces of peds; few patchy clay films on faces of peds and lining pores; few fine black concretions; very strongly acid; diffuse wavy boundary.

B3—57 to 80 inches; brown (10YR 4/3) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and common medium faint grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; firm; few fine roots; dark grayish brown (10YR 4/2) coatings on faces of peds; common fine black concretions; medium acid.

Solum thickness is more than 60 inches.

The A1 horizon is 8 to 16 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Where the A11 horizon has chroma of 2, the A12 horizon has chroma of 3. The A1 horizon is mottled in shades of brown or gray and is silt loam. The clay content of the A1 horizon ranges from 15 to 26 percent. Reaction ranges from slightly acid to very strongly acid.

The A2 horizon is 0 to 8 inches thick. It has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. It is mottled in shades of brown or gray and is silt loam. The clay content ranges from 15 to 26 percent. Reaction is strongly acid or very strongly acid.

Some pedons have a B1 horizon 8 to 16 inches thick that has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. It is mottled in shades of brown or gray. Texture is silt loam or silty clay loam, and clay content ranges from 18 to 30 percent. Some pedons have coatings on faces of peds that have chroma of 1 or 2. Reaction is slightly acid to very strongly acid.

The B21t horizon is 8 to 30 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is mottled in shades of brown or gray. Texture is silty clay loam, and clay content ranges from 27 to 35 percent. Some pedons have coatings on faces of peds that have chroma of 1 or 2. Reaction is slightly acid to very strongly acid.

The B22t horizon is 12 to 24 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is mottled in shades of brown or gray. Texture is silty clay loam or clay loam, and clay content ranges from 27 to 35 percent. Some pedons have coatings on faces of peds that have chroma of 1 or 2. Reaction is very strongly acid to neutral.

The B3 horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is mottled in shades of brown or gray. Texture is silty clay loam or clay loam, and clay content ranges from 27 to 35 percent. Some pedons have coatings on faces of peds that have chroma of 1 or 2. Reaction is neutral to strongly acid.

Dela series

The Dela series consists of deep, moderately well drained, moderately rapidly permeable soils that formed in loamy alluvial sediments. These nearly level to very gently sloping soils are on narrow flood plains.

Dela soils are associated with Ceda, Kenn, and Rexor soils. Ceda soils have more than 35 percent coarse fragments. Kenn and Rexor soils have an argillic horizon.

The soils of the Dela series are coarse-loamy, siliceous, nonacid, thermic Typic Udifluvents.

Typical pedon of Dela fine sandy loam, 700 feet west and 600 feet north of the southeast corner of sec. 33, T. 6 N., R. 19 E.

A1—0 to 12 inches; brown (10YR 4/3) fine sandy loam; moderate medium granular structure; very friable; many fine roots; few black and brown concretions; few fine fragments of sandstone; medium acid; gradual smooth boundary.
C1—12 to 36 inches; brown (7.5YR 4/4) fine sandy loam; structureless; friable; common fine roots; few fine fragments of sandstone; medium acid; smooth boundary.
C2—36 to 48 inches; brown (7.5YR 4/4) fine sandy loam; structureless; friable; few thin strata of reddish brown (5YR 4/4) sandy clay loam; strongly acid; clear smooth boundary.
C3—48 to 60 inches; dark yellowish brown (10YR 4/4) fine sandy loam; structureless; friable; few thin strata of brown (7.5YR 4/4) loam; strongly acid; clear smooth boundary.
C4—60 to 72 inches; yellowish brown (10YR 5/6) sandy loam; common medium distinct strong brown (7.5YR 5/6) and pale brown (10YR 6/3) mottles; structureless; friable; fragments of sandstone make up about 5 percent by volume; few thin strata of brown loam; strongly acid.

The A horizon is 8 to 16 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Reaction is slightly acid or strongly acid.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. Mottles that have chroma of 2 or less occur at depths below 30 inches in some pedons. The average texture of the 10- to 40-inch control section is fine sandy loam, sandy loam, or loam. Below a depth of 40 inches, the texture is fine sandy loam, sandy loam, or loamy fine sand with thin strata of other textures. In some pedons, buried horizons that have clay content ranging from 18 to 35 percent are below a depth of 40 inches. Fragments of sandstone make up 0 to 15 percent by volume. Reaction is slightly acid to strongly acid.

Denman series

The Denman series consists of deep, well drained, slowly permeable soils that formed in loamy colluvial material over shale. These strongly sloping to steep soils are on side slopes and foot slopes of mountains.

Denman soils are associated with Bengal, Carnasaw, and Clebit soils. Bengal soils have a solum 20 to 40 inches thick. Carnasaw soils have more clay in the upper part of the argillic horizon. Clebit soils are shallow and formed in material weathered from sandstone.

The soils of the Denman series are fine-loamy over clayey, siliceous, thermic Typic Hapludults.

Typical pedon of Denman stony loam in an area of Denman-Carnasaw association, steep, about 1,200 feet north and 1,200 feet west of the southeast corner of sec. 28, T. 5 N., R. 19 E.

A1—0 to 6 inches; dark brown (10YR 3/3) stony loam; weak fine granular structure; friable; common fine roots; fragments of sandstone make up 25 percent by volume; medium acid; gradual wavy boundary.
B1—6 to 10 inches; brown (.5YR 4/4) cobbly loam; weak medium granular structure; friable; common fine roots; fragments of sandstone make up 25 percent by volume; medium acid; gradual wavy boundary.
B21t—10 to 22 inches; strong brown (7.5YR 5/6) gravelly clay loam; moderate medium subangular blocky structure; firm; common fine roots; few patchy clay films on faces of peds; fragments of sandstone make up 20 percent by volume; very strongly acid; clear wavy boundary.
IIB22t—22 to 46 inches; yellowish red (5YR 5/6) silty clay; many fine and medium distinct light brownish gray (2.5Y 6/2) and red (2.5YR 5/6) mottles; moderate medium blocky structure; very firm; few fine roots; clay films on faces of peds; fragments of shale make up 5 percent by volume; very strongly acid; diffuse wavy boundary.
IIB3—46 to 56 inches; olive gray (5Y 5/2) silty clay; many medium faint dark gray (5Y 4/1) and olive brown (2.5Y 4/4) mottles; weak coarse blocky structure; very firm; fragments of shale make up 10 percent by volume; strongly acid; diffuse wavy boundary.
IICr—56 to 80 inches; dark gray (10YR 4/1) and olive gray (5Y 5/2) shale tilted 30 degrees from horizontal; medium acid.

Solum thickness and depth to shale bedrock range from 40 to 60 inches.

The A1 horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Sandstone fragments make up 20 to 50 percent by volume. Reaction is medium acid or strongly acid.

Some pedons have an A2 horizon 3 to 6 inches thick. The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. Texture, reaction, and content of sandstone fragments are the same as in the A1 horizon.

The B1 horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 6. Texture is cobbly loam, cobbly clay loam, stony loam, or stony clay loam. Fragments of sandstone make up 15 to 35 percent by volume. Reaction is medium acid to very strongly acid.

The B21t horizon has hue of 5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. Some pedons have red or brown mottles. Texture is cobbly loam, cobbly clay loam, gravelly loam, gravelly clay loam, loam, or clay loam. Sandstone fragments make up 10 to 30 percent by volume. Reaction is strongly acid or very strongly acid.

The IIB22t horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. Mottles are in shades of red, brown, and gray. Texture is clay or silty clay. Sandstone fragments make up 0 to 10 percent by volume. Reaction is strongly acid or very strongly acid.

The IIB3 horizon is variegated in shades of red, brown, and gray. Texture is clay, silty clay, shaly clay, or shaly silty clay. Shale fragments make up 10 to 30 percent by volume. Reaction is strongly acid to very strongly acid.

The IICr horizon is grayish or olive shale that is tilted more than 20 degrees from horizontal. Reaction is neutral to medium acid.

Freestone Variant

The Freestone Variant consists of deep, somewhat poorly drained, moderately slowly permeable soils that formed in loamy alluvial sediments. These nearly level soils are on terraces of fans of local outwash material. These soils are variants to the Freestone series because they occur in a cooler climate. In addition, they have less than 35 percent clay in the lower part of the B2t and B3 horizons. They are moderately slowly permeable in the lower part of the solum and have low shrink-swell potential.

Freestone Variant soils are associated with the Bernow Variant and Ceda, Sallisaw, and Wister soils. Bernow Variant soils are better drained and are on higher areas of the landscape. Ceda soils do not have an argillic horizon and have more than 35 percent coarse fragments in the control section. Sallisaw soils have more than 35 percent coarse fragments in the lower part of the argillic horizon. Wister soils have a clayey control section and have shale bedrock at a depth of 40 to 60 inches.

The Freestone Variant soils are fine-loamy, siliceous, thermic Glossaquic Paleudalfs.

Typical pedon of Freestone Variant fine sandy loam in an area of Freestone Variant-Bernow Variant complex, 0 to 2 percent slopes, 100 feet east and 100 feet south of the northwest corner of sec. 16, T. 3 N., R. 21 E.

A1—0 to 9 inches; brown (10YR 5/3) fine sandy loam; weak medium granular structure; friable; medium acid; clear wavy boundary.

B1—9 to 18 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium faint strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; strongly acid; gradual wavy boundary.

B21t—18 to 28 inches; coarsely mottled yellowish brown (10YR 5/4), grayish brown (10YR 5/2), and yellowish red (5YR 5/6) clay loam; moderate medium subangular blocky structure; firm; many discontinuous clay films on faces of peds; very strongly acid; diffuse wavy boundary.

B22t—28 to 46 inches; coarsely mottled yellowish brown (10YR 5/6), grayish brown (10YR 5/2), brown (10YR 4/3), and yellowish red (5YR 5/6) clay loam; moderate medium subangular blocky structure; firm; many discontinuous clay films on faces of peds; 5 percent by volume of clean sand grains; very strongly acid; diffuse wavy boundary.

B3—46 to 72 inches; coarsely mottled gray (10YR 6/1), light yellowish brown (10YR 6/4), and brown (10YR 5/3) clay loam; moderate medium subangular blocky structure; firm; few discontinuous clay films on faces of peds; 5 percent by volume of clean sand grains; common fine black concretions; strongly acid.

Solum thickness and depth to bedrock are more than 60 inches. Mottles that have chroma of 2 or less occur within 30 inches of the surface.

The A horizon is 5 to 10 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Reaction is medium acid to very strongly acid.

The B1 horizon is 6 to 20 inches thick. It has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. Texture is fine sandy loam, loam, or sandy clay loam. Reaction is medium acid to very strongly acid.

The B2t horizon is 28 to 56 inches thick. It has hue of 10YR, value of 4 to 6, and chroma of 2 to 6. Most pedons are coarsely mottled in shades of gray, brown, and red. Texture is sandy clay loam or clay loam. Clean sand grains make up 10 percent by volume. Reaction is medium acid to very strongly acid.

The B3 horizon is 18 to 30 inches thick. It has hue of 10YR, value of 5 to 7, and chroma of 1 to 6. Most pedons are coarsely mottled in shades of gray, red, or brown, Texture is clay loam or sandy clay loam. Clean sand grains make up 5 to 10 percent by volume of the B3 horizon. Reaction is medium acid to very strongly acid.

Kanima series

The Kanima series consists of deep, well drained, moderately permeable soils that formed in excavated loamy material weathered from sandstone and shale. These soils are on gently sloping valleys to very steep hills or ridges that formed as the result of strip mining.

Kanima soils are associated with Counts, Sobol, Stigler, Tamaha, and Wing soils, all of which have an argillic horizon and are in unmined areas.

The soils of the Kanima series are loamy-skeletal, mixed, nonacid, thermic Udalfic Arents.

Typical pedon of Kanima shaly silty clay loam, 30 to 50 percent slopes, about 2,000 feet north and 600 feet west of the southwest corner of sec. 13, T. 6 N., R. 21 E.

A1—0 to 8 inches; dark grayish brown (10YR 4/2) shaly silty clay loam; massive; friable; fragments of shale make up 30 percent by volume; few fragments of coal; neutral; diffuse wavy boundary.

C—8 to 72 inches; dark grayish brown (2.5Y 4/2) very shaly silty clay loam; massive; friable; fragments of

shale make up 75 percent by volume; few fragments of coal; few fragments of yellowish brown (10YR 5/6), mottled clay having patchy clay films; neutral.

The A horizon is 4 to 12 inches thick. It has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 4. Texture is shaly clay loam, very shaly clay loam, shaly silty clay loam, or very shaly silty clay loam. Fragments of shale make up 15 to 90 percent volume. Reaction is medium acid to moderately alkaline.

The C horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 2 to 4. It is very shaly silty clay loam or very shaly silt loam. It contains fragments of the B2t horizon that vary in color, texture, and reaction. Fragments of shale make up 35 to 90 percent by volume.

Kenn series

The Kenn series consists of deep, well drained, moderately permeable soils that formed in loamy alluvium. These nearly level to gently sloping soils are on flood plains of local streams.

Kenn soils are associated with Ceda, Dela, Rexor, and Neff soils. Ceda soils have a loamy-skeletal control section. Dela soils do not have an argillic horizon and have a coarse-loamy control section. Rexor and Neff soils have a fine-silty control section.

The soils of the Kenn series are fine-loamy, siliceous, thermic Ultic Hapludalfs.

Typical pedon of Kenn loam in an area of Kenn-Ceda complex, 0 to 2 percent slopes, about 1,000 feet north and 2,300 feet west of the southwest corner of sec. 4, T. 4 N., R. 21 E.

A1—0 to 9 inches; dark brown (10YR 3/3) loam; weak medium granular structure; friable; fragments of sandstone make up 5 percent by volume; strongly acid; gradual smooth boundary.

B2t—9 to 34 inches; yellowish red (5YR 5/6) gravelly sandy clay loam; weak medium subangular blocky structure; friable; fragments of sandstone make up 15 percent by volume; few clay films on face of peds; strongly acid; gradual wavy boundary.

IIB3—34 to 43 inches; brown (7.5YR 4/4) very gravelly sandy clay loam; weak medium subangular blocky structure; friable; fragments of sandstone make up 60 percent by volume; very strongly acid; gradual wavy boundary.

IIC—43 to 60 inches; brown (10YR 4/3) very gravelly loam; massive; friable; fragments of sandstone make up 70 percent by volume; very strongly acid.

Solum thickness is 40 to 60 inches. The depth to the gravelly IIB3 horizon ranges from 20 to 40 inches.

The A horizon is 5 to 11 inches thick. It has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. Content of coarse fragments of sandstone is 5 to 15 percent by volume. Reaction is medium acid or strongly acid.

Some pedons have a B1 horizon 4 to 6 inches thick. This horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It has the same texture, reaction, and content of coarse fragments as the A horizon but is higher in content of clay.

The B2t horizon is 12 to 30 inches thick. It has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is sandy clay loam, clay loam, gravelly sandy clay loam, or gravelly clay loam. Content of coarse fragments of sandstone is 5 to 30 percent by volume. Reaction is strongly acid or very strongly acid.

The IIB3 horizon is 10 to 24 inches thick. It has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. It is very gravelly sandy clay loam, very gravelly clay loam, cobbly sandy clay loam, or cobbly clay loam. Content of coarse fragments of sandstone is 35 to 80 percent by volume. Reaction is strongly acid or very strongly acid.

The IIC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is very gravelly loam, very gravelly fine sandy loam, cobbly loam, cobbly fine sandy loam, stony loam, or stony fine sandy loam. Content of coarse fragments of sandstone is 60 to 90 percent by volume. Reaction is strongly acid or very strongly acid.

The IIC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is very gravelly loam, very gravelly fine sandy loam, cobbly loam, cobbly fine sandy loam, stony loam, or stony fine sandy loam. Content of coarse fragments of sandstone is 60 to 90 percent by volume. Reaction is strongly acid or very strongly acid.

Neff series

The Neff series consists of deep, moderately well drained, moderately slowly permeable soils that formed in loamy alluvium. These nearly level to very gently sloping soils are on broad flood plains.

Neff soils are associated with Cupco, Dela, and Rexor soils. Cupco soils are somewhat poorly drained. Dela soils do not have an argillic horizon and have a coarse-loamy control section. Rexor soils are well drained.

Typical pedon of Neff silt loam, 500 feet south and 100 feet east of the northwest corner of sec. 11, T. 6 N., R. 22 E.

A1—0 to 10 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many fine roots; medium acid; gradual smooth boundary.

B1—10 to 18 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; friable; common fine roots; few fine dark brown concretions; strongly acid; gradual smooth boundary.

B2t—18 to 35 inches; yellowish brown (10YR 5/4) silty clay loam; common fine and medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; firm; few fine roots; common fine dark brown concretions; few to

common clay films on faces of peds; medium acid; gradual smooth boundary.

B3—35 to 62 inches; dark yellowish brown (10YR 4/4) silty clay loam, many medium distinct light brownish gray (10YR 6/2) and many medium faint dark brown (10YR 3/3) mottles; weak coarse and medium subangular blocky structure; firm; common fine dark brown and black concretions; strongly acid.

Solum thickness is more than 60 inches.

The A1 horizon is 6 to 16 inches thick. It has hue of 10YR, value of 4, and chroma of 2 to 4. Reaction is medium acid to very strongly acid in unlimed areas.

The B1 horizon is 0 to 14 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Texture is loam or silt loam. Some pedons have mottles in shades of brown or gray. Reaction is medium acid to very strongly acid.

The B2t horizon is 17 to 36 inches thick. It has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. Texture is silt loam or silty clay loam. This horizon has common to many mottles in shades of gray or brown. Reaction is slightly acid to very strongly acid.

The B3 horizon is 14 to 30 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Texture is silt loam or silty clay loam. This horizon has common to many mottles in shades of gray or brown. Reaction is slightly acid to very strongly acid.

Octavia series

The Octavia series consists of deep, moderately well drained, moderately slowly permeable soils. These soils formed in loamy colluvium over clay on steep benches and foot slopes of mountains.

Octavia soils are associated with Carnasaw, Clebit, Denman, and Panama soils. Carnasaw soils have a clayey control section. Clebit soils are shallow over sandstone bedrock. Denman soils have shale bedrock within a depth of 40 to 60 inches. Panama soils have more than 35 percent coarse fragments in the control section.

The soils of the Octavia series are fine-loamy, siliceous, thermic Typic Paleudults.

Typical pedon of Octavia stony loam in an area of Octavia-Carnasaw-Clebit association, cool, steep, 1,320 feet south and 50 feet west of the northeast corner of sec. 2, T. 3 N., R. 20 E.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) stony loam; moderate medium granular structure; friable; many fine and medium roots; fragments of sandstone make up 30 percent by volume; medium acid; clear wavy boundary.

A2—4 to 8 inches; brown (10YR 5/3) stony loam; weak medium granular structure; friable; common fine and medium roots; fragments of sandstone make up 30 percent by volume; strongly acid; gradual wavy boundary.

B1—8 to 16 inches; strong brown (7.5YR 5/6) gravelly loam; weak fine subangular blocky structure; friable; few fine roots; fragments of sandstone make up 20 percent by volume; very strongly acid; gradual smooth boundary.

B21t—16 to 27 inches; yellowish red (5YR 5/8) gravelly sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; fragments of sandstone make up 25 percent by volume; common clay films on faces of peds; very strongly acid; gradual wavy boundary.

B22t—27 to 45 inches; red (2.5YR 4/6) gravelly clay loam; many coarse distinct strong brown (7.5YR 5/6) and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm; few fine roots; sandstone fragments make up 20 percent by volume; many clay films on faces of peds; very strongly acid; clear wavy boundary.

IIB23t—45 to 65 inches; coarsely mottled red (2.5YR 4/6), strong brown (7.5YR 5/6), and light gray (10YR 7/1) clay; weak medium subangular blocky structure; very firm; few clay films on faces of peds; very strongly acid.

Solum thickness is more than 60 inches.

The A1 horizon is 3 to 6 inches thick. It has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Fragments of sandstone make up 5 to 35 percent by volume. Reaction is medium acid or strongly acid.

The A2 horizon is 3 to 10 inches thick. It has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. Texture, content of coarse fragments, and reaction are the same as in the A1 horizon.

The B1 horizon is 5 to 12 inches thick. It has hue of 7.5YR or 10YR, value of 5 or 6, and chroma 4 to 6. Texture is stony loam, gravelly loam, or loam. Fragments of sandstone make up 5 to 30 percent by volume. Reaction is strongly acid or very strongly acid.

The B2t horizon is 16 to 50 inches thick. It has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 6. Texture is gravelly clay loam, gravelly sandy clay loam, sandy clay loam, or clay loam. Fragments of sandstone make up 5 to 30 percent by volume. Reaction is strongly acid or very strongly acid.

The IIB23t horizon is mottled in shades of red, brown, and gray. Texture is clay, shaly clay, clay loam, or shaly clay loam. Fragments of shale make up 5 to 20 percent by volume. Reaction is strongly acid or very strongly acid.

Panama series

The Panama series consists of deep, moderately well drained, moderately slowly permeable skeletal soils that formed in loamy colluvium over clay. These steep soils are on benches and foot slopes of mountains.

Panama soils are associated with Carnasaw, Clebit, Denman, Octavia, and Pirum soils. Carnasaw soils have

a clayey control section. Clebit soils are shallow over sandstone. Denman soils have shale bedrock within a depth of 40 to 60 inches. Octavia and Pirum soils have less than 35 percent coarse fragments in the control section and have more clay in the lower part of the solum.

The soils of the Panama series are loamy-skeletal, siliceous, thermic Typic Paleudults.

Typical pedon of Panama stony loam in an area of Pirum-Carnasaw-Panama association, steep, 1,800 feet north and 800 feet west of the southeast corner of sec. 25, T. 5 N., R. 19 E.

A1—0 to 5 inches; brown (7.5YR 4/2) stony loam; weak medium granular structure; friable; many fine and medium roots; fragments of sandstone make up 30 percent by volume; medium acid; clear wavy boundary.

B1—5 to 15 inches; yellowish red (5YR 4/6) stony loam; moderate medium subangular blocky structure; friable; many fine and medium roots; fragments of sandstone make up 30 percent by volume; strongly acid; clear wavy boundary.

B21t—15 to 29 inches; yellowish red (5YR 4/6) cobbly clay loam; moderate medium subangular blocky structure; firm; many medium and fine roots; common clay films on faces of peds; fragments of sandstone make up 55 percent by volume; strongly acid; gradual wavy boundary.

B22t—29 to 49 inches; strong brown (7.5YR 5/6) cobbly clay loam; common medium distinct yellowish red (5YR 4/6) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; many medium and fine roots; common clay films on faces of peds; fragments of sandstone make up 50 percent by volume; strongly acid; gradual wavy boundary.

IIB23t—49 to 65 inches; coarsely mottled red (2.5YR 4/8), yellowish brown (10YR 5/6), and gray (10YR 6/1) clay; moderate coarse subangular blocky structure; firm; common clay films on faces of peds; very strongly acid; diffuse wavy boundary.

IIB24t—65 to 77 inches; coarsely mottled yellowish brown (10YR 5/6) and gray (10YR 6/1) clay; weak coarse subangular blocky structure; firm; fragments of shale make up 5 percent by volume; very strongly acid.

Solum thickness is more than 60 inches.

The A1 horizon is 3 to 8 inches thick. It has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 or 3. Fragments of sandstone make up 15 to 45 percent by volume. Reaction is medium acid to strongly acid.

Some pedons have an A2 horizon 3 to 8 inches thick. The A2 horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 6. Texture, reaction, and content of coarse fragments of sandstone are the same as in the A1 horizon.

The B1 horizon is 7 to 15 inches thick. It has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. Texture is gravelly loam, very gravelly loam, gravelly clay loam, or very gravelly clay loam. Fragments of sandstone make up 15 to 60 percent by volume. Reaction is strongly acid or very strongly acid.

The B2t horizon is 10 to 48 inches thick. It has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 6 to 8. Some pedons have common to many mottles in shades of yellow and brown in the lower part of the B2t horizon. Fragments of sandstone make up 35 to 70 percent by volume. Reaction is strongly acid or very strongly acid.

The IIB2t horizon is coarsely mottled in shades of red, brown, and gray. Texture is clay or silty clay. Fragments of shale make up 0 to 15 percent by volume. Reaction is strongly acid or very strongly acid.

Pickens Variant

The Pickens Variant consists of shallow, somewhat excessively drained, moderately permeable soils that formed in loamy material weathered from shaly sandstone or sandy shale. These steep soils are on side slopes of mountains. They are variants to the Pickens series in that they are siliceous and have soft shale at a depth of 10 to 20 inches.

Pickens Variant soils are associated with Carnasaw and Clebit soils. Carnasaw soils are deeper and have a clayey argillic horizon. Clebit soils are underlain by hard sandstone bedrock.

The Pickens Variant soils are loamy-skeletal, siliceous, thermic Typic Dystrochrepts.

Typical pedon of Pickens Variant bouldery loam in an area of Carnasaw-Clebit-Pickens Variant association, steep, 2,000 feet north and 50 feet west of the southeast corner of sec. 34, T. 6 N., R. 20 E.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) bouldery loam; moderate medium granular structure; friable; many fine and medium roots; fragments of sandstone and shale make up 35 percent by volume; medium acid; gradual wavy boundary.

B2—6 to 19 inches; yellowish brown (10YR 5/4) very shaly loam, weak medium subangular blocky structure; friable; many fine roots; fragments of shale make up 60 percent by volume; very strongly acid; gradual irregular boundary.

Cr—19 to 24 inches; olive (5Y 5/4) sandy shale tilted 60 degrees from horizontal.

Solum thickness and depth to shale bedrock are 10 to 20 inches.

The A1 horizon is 3 to 6 inches thick. It has hue of 10YR, value of 4, and chroma of 2 or 3. Fragments of shale make up 35 to 70 percent by volume. Reaction is slightly acid to strongly acid.

Some pedons have a thin A2 horizon. Texture, reaction, and content of sandstone and shale fragments

are the same as in the A1 horizon. The A2 horizon has color value slightly higher than the A1 horizon.

The B2 horizon is 4 to 16 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. Fragments of shale make up 35 to 70 percent by volume. Reaction is medium acid to very strongly acid.

The Cr horizon is sandy shale that is tilted more than 20 degrees from horizontal. It has hue of 2.5YR or 5Y, value of 5, and chroma of 2 to 6.

Pirum series

The Pirum series consists of moderately deep, well drained, moderately permeable soils that formed in loamy material weathered from sandstone. These very gently sloping to steep soils are on side slopes of hills and mountains.

Pirum soils are associated with Carnasaw, Clebit, and Panama soils. Carnasaw soils have a clayey control section. Clebit soils have a solum less than 20 inches thick. Panama soils have a loamy-skeletal control section and a solum more than 60 inches thick.

The soils of the Pirum series are fine-loamy, siliceous, thermic Typic Hapludults.

Typical pedon of Pirum fine sandy loam, 3 to 5 percent slopes, 500 feet west and 2,000 feet north of the southeast corner of sec. 31, T. 6 N., R. 19 E.

A—0 to 6 inches; brown (10YR 4/3) fine sandy loam; moderate medium granular structure; friable; medium acid; clear smooth boundary.

A2—6 to 12 inches; brown (10YR 5/3) fine sandy loam; weak medium granular structure; friable; few fine brown concretions; strongly acid; gradual wavy boundary.

B21t—12 to 24 inches; yellowish red (5YR 4/6) clay loam; moderate medium subangular blocky structure, firm; clay films on faces of peds; few fine brown concretions; strongly acid; gradual wavy boundary.

B22t—24 to 31 inches; yellowish red (5YR 5/6) sandy clay loam; weak medium subangular blocky structure; firm; patchy clay films on faces of peds; fragments of sandstone make up 10 percent by volume; strongly acid; abrupt irregular boundary.

R—31 to 35 inches; hard sandstone tilted 30 degrees from horizontal.

Solum thickness and depth to bedrock range from 20 to 40 inches.

The A1 horizon is 4 to 10 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Reaction is strongly acid or very strongly acid in unlimed areas.

The A2 horizon is 0 to 6 inches thick. It has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. Texture is fine sandy loam or loam. Reaction is strongly acid or very strongly acid.

The B21t horizon is 10 to 20 inches thick. It has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. Texture is sandy loam or clay loam. Reaction is strongly acid or very strongly acid.

The B22t horizon is 6 to 12 inches thick. It has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 6. Texture is loam, sandy clay loam, or clay loam. Fragments of sandstone less than 76 millimeters in diameter make up 0 to 15 percent by volume. Reaction is strongly acid or very strongly acid.

The R layer is hard sandstone that is commonly interbedded with thin strata of siltstone or shale. This layer tilts more than 20 degrees from horizontal.

Rexor series

The Rexor series consists of deep, moderately permeable soils that formed in loamy alluvial material. These nearly level to very gently sloping soils are on flood plains of local streams.

Rexor soils are associated with Cupco, Dela, and Neff soils. Cupco soils are somewhat poorly drained. Dela soils have a coarse-loamy control section. Neff soils are in slightly lower or concave areas.

The soils of the Rexor series are fine-silty, siliceous, thermic Ultic Hapludalfs.

Typical pedon of Rexor silt loam, 1,300 feet east and 800 feet north of the southwest corner of sec. 31, T. 6 N., R. 19 E.

A1—0 to 10 inches; brown (10YR 4/3) silt loam; weak medium granular structure; friable; many fine roots; medium acid; gradual smooth boundary.

B21t—10 to 32 inches; brown (10YR 4/3) silty clay loam; weak medium subangular blocky structure; firm; common fine roots; patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B22t—32 to 72 inches; yellowish brown (10YR 5/6) silt loam; common fine and medium faint brown (10YR 5/3) mottles; weak coarse subangular blocky structure; firm; few fine roots; patchy clay films on faces of peds and in the lining of pores; strongly acid.

Solum thickness and depth to bedrock are more than 60 inches.

The A horizon is 7 to 14 inches thick. It has hue of 10YR, value of 4, and chroma of 2 to 4. Reaction is medium acid or strongly acid.

The B2t horizon is 15 to 65 inches thick. It has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. The B2t horizon has few to many fine or medium mottles in shades of gray, brown, and yellow. It is silt loam, silty clay loam, clay loam, or loam. Reaction is medium acid to very strongly acid.

Some pedons have a B3 horizon that is 10 to 28 inches thick. The B3 horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 6. It has few to many medium or coarse mottles in shades of red, brown, and gray. Reaction is medium acid to very strongly acid.

Sallisaw series

The Sallisaw series consists of deep, well drained, moderately permeable soils that formed in loamy and gravelly alluvial material. These very gently sloping soils are on high terraces, above overflow, along local streams.

Sallisaw soils are associated with Ceda, Kenn, and Wilburton soils. Ceda soils have a loamy-skeletal control section and are in lower areas that are flooded. Kenn soils are similar to Sallisaw soils but are on flood plains at lower elevations. Wilburton soils are at the same elevation but have a loamy-skeletal control section.

The soils of the Sallisaw series are fine-loamy, siliceous, thermic Typic Paleudalfs.

Typical pedon of Sallisaw loam, 1 to 3 percent slopes, 1,700 feet south and 900 feet west of the northeast corner of sec. 11, T. 4 N., R. 21 E.

A1—0 to 8 inches; brown (10YR 4/3) loam; weak fine granular structure; friable; medium acid; gradual smooth boundary.

B1—8 to 13 inches; brown (7.5YR 4/4) loam; weak coarse prismatic structure; friable; few fragments of sandstone less than 76 mm in diameter; medium acid; gradual smooth boundary.

B2t—13 to 34 inches; reddish brown (5YR 4/4) light clay loam; weak medium subangular blocky structure; firm; continuous clay films on faces of peds; few fragments of sandstone less than 76 mm in diameter; strongly acid; gradual wavy boundary.

IIB3—34 to 72 inches; strong brown (7.5YR 5/6) very gravelly clay loam, common medium and coarse distinct red (2.5YR 5/6) and pale brown (10YR 6/3) mottles; weak fine subangular blocky structure; firm; few clay films on faces of peds; fragments of sandstone less than 76 mm in diameter make up 55 percent by volume; strongly acid.

Solum thickness and depth to bedrock are more than 60 inches.

The A horizon is 6 to 12 inches thick. It has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. Fragments of sandstone make up 0 to 35 percent by volume. Reaction is slightly acid to medium acid.

The B1 horizon is 5 to 11 inches thick. It has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 or 5. It is sandy clay loam, loam, gravelly sandy clay loam, or gravelly loam. Reaction is medium acid or strongly acid.

The B2t horizon is 11 to 23 inches thick. It has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is clay loam, sandy clay loam, gravelly clay loam, or gravelly sandy clay loam. Clay content ranges from 18 to 35 percent, and gravel content ranges from 0 to 35 percent by volume. Reaction is medium acid or strongly acid.

The IIB3 horizon is 10 to 40 inches thick. It has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 6. It is gravelly clay loam, gravelly sandy clay loam, very gravelly clay loam, or very gravelly sandy clay loam. Fragments of sandstone make up 35 to 85 percent by volume. In some pedons few to many medium or coarse mottles of red, brown, and yellow occur in the IIB3 horizon. Reaction is medium acid or strongly acid.

Shermore series

The Shermore series consists of deep, moderately well drained, moderately slowly permeable soils that have a fragipan. These very gently sloping to gently sloping soils are on foot slopes, benches, and outwash fans in the valleys. They formed in loamy sediments.

Shermore soils are associated with Bengal, Carnasaw, Clebit, Pirum, and Stigler soils. Unlike Shermore soils, these soils do not have a fragipan. Bengal, Carnasaw, and Stigler soils have a clayey control section. Clebit soils have a solum 10 to 20 inches thick over sandstone bedrock. Pirum soils have a solum 20 to 40 inches over sandstone bedrock.

The soils of the Shermore series are fine-loamy, siliceous, thermic Typic Fragiudalfs.

Typical pedon of Shermore fine sandy loam, 3 to 5 percent slopes, is 2,200 feet east and 2,900 feet north of the southwest corner of sec. 31, T. 6 N., R. 19 E.

A11—0 to 6 inches; dark brown (10YR 3/3) fine sandy loam; moderate medium subangular blocky structure; friable; many fine roots; strongly acid; gradual wavy boundary.

A12—6 to 14 inches; brown (10YR 4/3) fine sandy loam; weak medium granular structure; friable; many fine roots; strongly acid; gradual wavy boundary.

B1—14 to 18 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable; common fine roots; few fine dark brown concretions; very strongly acid; gradual wavy boundary.

B21t—18 to 36 inches; yellowish brown (10YR 5/4) clay loam; few fine and medium distinct light yellowish brown (10YR 6/4), strong brown (7.5YR 5/6), and yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; firm; few clay films on faces of peds and in pores; common medium black and brown concretions; very strongly acid; diffuse wavy boundary.

Bx1—36 to 55 inches; coarsely mottled yellowish brown (10YR 5/6), gray (10YR 6/1), yellowish red (5YR 4/6), and strong brown (7.5YR 5/6) clay loam; moderate coarse prismatic structure parting to coarse medium subangular blocky; brittle; common clay films on faces of peds and in pores; common medium and coarse black and brown concretions; few pockets of clean silt and sand grains; very strongly acid; diffuse wavy boundary.

Bx2—55 to 70 inches; coarsely mottled light yellowish brown (10YR 6/4), pale brown (10YR 6/3), dark brown (10YR 3/3), strong brown (7.5YR 5/6), and

gray (10YR 6/1) clay loam; weak coarse prismatic structure parting to coarse medium subangular blocky; brittle; common clay films on faces of peds and in pores; common medium and coarse black and brown concretions; about 10 percent by volume of clean silt and sand grains; strongly acid; diffuse wavy boundary.

Bx3—70 to 80 inches; light yellowish brown (10YR 6/4) clay loam; many fine and medium distinct yellowish brown (10YR 5/6), dark brown (10YR 3/3), light gray (10YR 7/2), and gray (10YR 6/1) mottles; weak medium subangular blocky structure; firm; few patchy clay films on faces of peds; few medium and coarse black and brown concretions; 10 percent by volume of clean silt and sand grains; strongly acid.

Solum thickness and depth to bedrock are more than 60 inches.

The A1 horizon is 7 to 14 inches thick. It has hue of 10YR, value of 3 to 6, and chroma of 2 to 4. Reaction is slightly acid to strongly acid.

Some pedons have an A2 horizon that is similar in color to the A1 horizon, but the value and chroma are 1 unit higher. Reaction and texture are similar to those in the A1 horizon.

The B1 horizon, which is 0 to 8 inches thick, has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. Texture is loam, clay loam, or sandy clay loam. Reaction is slightly acid to very strongly acid.

The B2t horizon is 15 to 25 inches thick. It has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It has few or common medium or coarse distinct or prominent mottles in shades of red or brown. Texture is clay loam, loam, or sandy clay loam. Reaction is medium acid to very strongly acid.

The Bx horiozn is more than 30 inches thick. It is coarsely mottled with red, brown, and gray. It also has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 4 to 8. The Bx horizon is clay loam, loam, or sandy clay loam. Albic materials in the form of skeletons and patches of clean silt and sand grains make up 5 to 10 percent by volume. Reaction is medium acid to very strongly acid.

Sobol series

The Sobol series consists of moderately deep, moderately well drained, slowly permeable soils that formed in material weathered from shale. These very gently sloping to moderately steep soils are on side slopes and ridge crests.

Sobol soils are associated with Counts, Stigler, Tamaha, Tuskahoma, and Wister soils. Counts, Stigler, and Tamaha soils are on lower lying areas and have a solum that is more than 40 inches thick. Tuskahoma soils have a solum 10 to 20 inches thick.

The soils in the Sobol series are fine, mixed, thermic Aquic Hapludalfs.

Typical pedon of Sobol silt loam, 2 to 5 percent slopes, 3,200 feet east and 3,200 feet south of the northwest corner of sec. 16, T. 5 N., R. 20 E.

A1—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; many roots; few fragments of sandstone; medium acid; gradual smooth boundary.

B1—7 to 14 inches; brown (10YR 4/3) clay loam; common fine faint dark brown mottles; moderate medium subangular blocky structure; friable; common roots; thin patchy clay films; few fine dark concretions; very strongly acid; gradual smooth boundary.

B2t—14 to 24 inches; dark yellowish brown (10YR 4/4) clay; common fine and medium yellowish brown (10YR 4/4) clay; common fine and medium yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) mottles; moderate medium blocky structure; firm; common distinct clay films on faces of peds; medium acid; gradual smooth boundary.

B3—24 to 36 inches; olive gray (5Y 4/2) silty clay; few fine and medium distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to weak medium blocky structure; very firm; common distinct clay films on faces of peds; fragments of shale make up 10 percent by volume; slightly acid; abrupt irregular boundary.

Cr—36 to 50 inches; olive brown (2.5Y 4/4) shale tilted 35 degrees from horizontal; neutral.

Solum thickness and depth to shale bedrock are 20 to 40 inches.

The A horizon is 6 to 10 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Reaction is medium acid or strongly acid.

The B1 horizon is 5 to 10 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. Texture is clay loam or silty clay loam. Reaction is slightly acid to very strongly acid.

The B2t horizon is 8 to 25 inches thick. It has hue of 10YR or 2.5YR, value of 4 or 5, and chroma of 2 to 6. Gray, brown, red, or olive mottles range from common to many. Texture is silty clay or clay. Reaction is slightly acid to very strongly acid.

The B3 horizon is 0 to 19 inches thick. It has hue of 10YR to 5Y, value of 4 or 5, and chroma of 2 to 4. It is silty clay, clay, shaly silty clay, or shaly clay. Shale fragments make up 0 to 20 percent by volume. Reaction is slightly acid to moderately alkaline.

The Cr horizon is olive, olive brown, or gray shale tilted more than 20 degrees from horizontal.

Stigler series

The Stigler series consists of deep, moderately well drained, very slowly permeable soils that formed in clayey and loamy sediments over interbedded shale and

sandstone. These nearly level to very gently sloping soils are in valleys.

Stigler soils are associated with Counts, Sobol, Tamaha, and Wing soils. Counts soils have a thinner A horizon and have an abrupt textural change between the A and Bt horizons. Sobol soils, which are on side slopes of ridges, have a solum 20 to 40 inches thick. Tamaha soils, also on side slopes, have an A horizon less than 16 inches thick. Wing soils have a thinner A horizon and have a B2t horizon that contains more than 15 percent exchangeable sodium.

The soils of the Stigler series are fine, mixed, thermic Aquic Paleudalfs.

Typical pedon of Stigler silt loam, 1 to 3 percent slopes, 1,900 feet south and 300 feet east of the northwest corner of sec. 12, T. 5 N., R. 17 E.

A1—0 to 11 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many fine roots; few dark brown concretions; strongly acid; gradual wavy boundary.

A2—11 to 22 inches; brown (10YR 5/3) silt loam; few fine faint yellowish brown mottles; weak medium granular structure; friable; common fine roots; common dark brown concretions; strongly acid; gradual wavy boundary.

B21t—22 to 35 inches; yellowish brown (10YR 5/4) silty clay; common medium distinct pale brown (10YR 6/3), brownish yellow (10YR 6/6), red (2.5YR 4/6), and gray (10YR 6/1) mottles; moderate medium blocky structure; very firm; clay films on faces of peds; few black and dark brown concretions; medium acid; diffuse wavy boundary.

B22t—35 to 55 inches; yellowish brown (10YR 5/6) silty clay; many medium and coarse distinct pale brown (10YR 6/3), dark brown (10YR 3/3), and gray (10YR 6/1) mottles; moderate medium blocky structure; very firm; clay films on faces of peds; few dark brown and black concretions; medium acid; diffuse wavy boundary.

B3—55 to 72 inches; coarsely mottled yellowish brown (10YR 5/6), brown (10YR 4/3), and gray (10YR 6/1) silty clay; weak coarse blocky structure; very firm; few clay films on faces of peds; few medium dark brown and black concretions; slightly acid.

Solum thickness and depth to shale are more than 60 inches. The combined thickness of the A1 and A2 horizons ranges from 16 to 30 inches.

The A1 horizon is 6 to 14 inches thick. It has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Some pedons have a few brown mottles. Reaction is strongly acid or very strongly acid.

The A2 horizon is 6 to 16 inches thick. It has hue of 10YR, value of 5 or 6, and chroma of 2 to 4. Texture is silt loam or loam. Some pedons have few to common brown mottles. Reaction is strongly acid.

The B21t horizon is 4 to 22 inches thick. It has hue of 10YR, value of 4 to 6, and chroma of 4 to 6. Texture is clay loam, silty clay loam, clay, or silty clay. Mottles are in shades of red, brown, and gray throughout the horizon. Reaction is medium acid to very strongly acid.

The B22t horizon is 8 to 30 inches thick. It has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4 to 6 or is coarsely mottled in shades of red, brown, and gray. Texture is clay loam, silty clay loam, clay, or silty clay. Reaction is mildly alkaline to strongly acid.

The B3 horizon is 8 to 24 inches thick. It has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6 or is coarsely mottled in shades of brown, yellow, and gray. Texture is clay loam, silty clay loam, clay, or silty clay. Fragments of shale less than 3 inches in diameter range from 0 to 5 percent by volume. Reaction is mildly alkaline to strongly acid.

Tamaha series

The Tamaha series consists of deep, moderately well drained, very slowly permeable soils that formed in alluvium or colluvium over interbedded shale and sandstone. These very gently sloping or gently sloping soils are on side slopes along drains or ridges in the valleys.

Tamaha soils are associated with Counts, Sobol, and Stigler soils. Counts soils have an abrupt textural boundary between the A and B21t horizons. Sobol soils, which are on higher lying convex ridges, have a solum 20 to 40 inches thick. Stigler soils, which are in lower lying areas, have a thicker A horizon.

The soils in the Tamaha series are fine, mixed, thermic Aquic Paleudalfs.

Typical pedon of Tamaha silt loam, 3 to 5 percent slopes, 2.500 feet south and 150 feet east of the northwest corner of sec. 13, T. 5 N., R. 18 E.

A1—0 to 11 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; many fine roots; few dark brown concretions; medium acid; gradual smooth boundary.

B1—11 to 18 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium subangular blocky structure; friable; common fine roots; common dark brown concretions; medium acid; gradual wavy boundary.

B21t—18 to 30 inches; yellowish brown (10YR 5/6) silty clay; few fine faint grayish brown (10YR 5/2) and many fine distinct yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; very firm; common clay films on faces of peds; few dark brown concretions; strongly acid; gradual wavy boundary.

B22t—30 to 48 inches; yellowish brown (10YR 5/6) silty clay; many coarse distinct brownish yellow (10YR 6/8) and common medium distinct grayish brown (10YR 5/2) mottles; moderate medium blocky structure; very firm; many clay films on faces of peds; few dark brown concretions; strongly acid; diffuse wavy boundary.

B3—48 to 64 inches; coarsely mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), brown (10YR 4/3), and gray (10YR 6/1) clay; weak medium blocky structure; very firm; few clay films on faces of peds; few fine dark brown and black concretions; fragments of shale make up 5 percent by volume; medium acid.

Solum thickness and depth to shale are more than 60 inches.

The A horizon is 6 to 16 inches thick. It has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. In eroded areas, the A horizon is less than 6 inches thick in some pedons. Reaction is slightly acid to very strongly acid.

The B1 horizon is 4 to 8 inches thick. It has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. Texture is silt loam, clay loam, or silty clay loam. Reaction is medium acid to very strongly acid.

The B2t horizon is 10 to 35 inches thick. It has hue of 10YR, value of 4 to 6, and chroma of 3 to 6, or is coarsely mottled in shades of brown, gray, yellow, or red. Texture is clay loam, silty clay loam, silty clay, or clay. Reaction is neutral to strongly acid.

The B3 horizon is 8 to 24 inches thick. It has hue of 10YR, value of 4 to 6, and chroma of 3 to 6 or is coarsely mottled in shades of brown, yellow, red, or gray. Texture is clay loam, silty clay loam, silty clay, or clay. Reaction is neutral to strongly acid. Fragments of shale less than 76 millimeters in diameter make up 0 to 5 percent by volume.

Tuskahoma series

The Tuskahoma series consists of shallow, moderately well drained, very slowly permeable soils that formed in material weathered from shale. These sloping to moderately steep soils are on side slopes of low ridges in valleys.

Tuskahoma soils are associated with Sobol and Wister soils. Sobol soils have a solum 20 to 40 inches thick. Wister soils, which are in lower areas, have a solum 40 to 60 inches thick.

The soils of the Tuskahoma series are clayey, mixed, thermic, shallow Albaquic Hapludalfs.

Typical pedon of Tuskahoma stony loam, in an area of Tuskahoma-Sobol complex, 8 to 20 percent slopes, 1,350 feet west and 700 feet south of the northeast corner of sec. 34, T. 3 N., R. 21 E.

A1—0 to 5 inches; brown (10YR 4/3) stony loam; weak medium granular structure; friable; fragments of sandstone make up 25 percent by volume; medium acid; clear smooth boundary.

B2t—5 to 10 inches; brown (7.5YR 4/4) clay; common medium distinct strong brown (7.5YR 5/6) and dark gray (10YR 4/1) clay; common medium distinct strong brown (7.5YR 5/6) and dark gray (10YR 4/1) mottles; moderate medium blocky structure; firm; few clay films on faces of peds; medium acid; gradual wavy boundary.

B3—10 to 14 inches; dark gray (10YR 4/1) shaly clay; common medium distinct strong brown (7.5YR 5/6) and brown (7.5YR 4/4) mottles; moderate medium blocky structure; firm; fragments of shale make up 30 percent by volume; medium acid; gradual wavy boundary.

Cr—14 to 19 inches; dark gray (10YR 4/1) shale tilted 40 degrees from horizontal; neutral.

Solum thickness and depth to bedrock are 10 to 20 inches.

The A horizon is 3 to 9 inches thick. It has hue of 10YR to 2.5Y, value of 3 to 5, and chroma of 2 or 3. Fragments of sandstone make up 10 to 30 percent by volume. Reaction is slightly acid or medium acid.

The B2t horizon is 3 to 9 inches thick. It has hue of 5YR or 2.5Y, value of 3 to 5, and chroma of 2 to 6. Mottles are in shades of red, gray, or brown. Texture is clay or silty clay. Reaction is strongly acid to mildly alkaline.

The B3 horizon is 0 to 8 inches thick. It has hue of 10YR or 2.5Y, value 4 or 5, and chroma of 1 or 2. Mottles are in shades of red, brown, or gray. Texture is shaly clay or shaly silty clay. Shale fragments make up 20 to 50 percent by volume. Reaction is medium acid to mildly alkaline.

The Cr horizon is olive gray or dark gray shale tilted more than 20 degrees from horizontal.

Wilburton series

The Wilburton series consists of deep, well drained, moderately permeable soils. These very gently sloping to moderately steep soils are on stream terraces and terrace escarpments. They formed in loamy sediments that have a high content of coarse fragments.

Wilburton soils are associated with Ceda, Dela, Kenn, and Sallisaw soils. Ceda and Dela soils do not have an argillic horizon and are on flood plains. Kenn soils have less than 35 percent coarse fragments in the control section and are on flood plains. Sallisaw soils are in similar areas, but they have less than 35 percent coarse fragments in the control section.

The soils in the Wilburton series are loamy-skeletal, siliceous, thermic Ultic Hapludalfs.

Typical pedon of Wilburton cobbly loam, 8 to 20 percent slopes, 1,500 feet east and 150 feet north of the southwest corner of sec. 33, T. 6 N., R. 18 E.

A1—0 to 7 inches; dark brown (10YR 4/3) cobbly loam; moderate medium granular structure; very friable; many roots of all sizes; fragments of sandstone make up 20 percent by volume; slightly acid; clear wavy boundary.

B1—7 to 13 inches; brown (7.5YR 4/4) cobbly loam; weak medium granular structure; friable; common

roots; fragments of sandstone make up 30 percent by volume; medium acid; gradual wavy boundary.
B2t—13 to 36 inches; reddish brown (5YR 4/4) very cobbly sandy clay loam; weak medium subangular blocky structure; firm; common roots; patchy clay films on faces of peds and on fragments of sandstone; fragments of sandstone make up 60 percent by volume; medium acid; diffuse wavy boundary.
B3—36 to 52 inches; yellowish red (5YR 4/6) very cobbly sandy clay loam; many medium distinct strong brown (7.5YR 5/6), brown (7.5YR 5/4), and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few roots; patchy clay films on faces of peds and on fragments of sandstone; fragments of sandstone make up 70 percent by volume; medium acid; diffuse wavy boundary.
C—52 to 80 inches; coarsely mottled brownish yellow (10YR 6/6), pale brown (10YR 6/3), light gray (10YR 6/1), and reddish yellow (5YR 6/6) very cobbly loam; massive; firm; common black or dark brown bodies, streaks, and concretions; sandstone fragments make up 80 percent by volume; strongly acid.

Solum thickness ranges from 40 to 60 inches. Depth to bedrock is more than 60 inches.

The A horizon is 5 to 12 inches thick. It has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. Fragments of sandstone make up 5 to 20 percent by volume. Reaction is slightly acid to strongly acid.

The B1 horizon is 0 to 9 inches thick. It has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 3 to 6. Texture is cobbly fine sandy loam, cobbly loam, or cobbly sandy clay loam. Fragments of sandstone make up 20 to 30 percent by volume. Reaction is medium acid or strongly acid.

The B2t horizon is 12 to 30 inches thick. It has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 6. Texture is gravelly or very gravelly clay loam, gravelly or very gravelly sandy clay loam, cobbly clay loam, or cobbly sandy clay loam. Fragments of sandstone make up 45 to 75 percent by volume. Reaction is medium acid to very strongly acid.

The B3 horizon is 12 to 30 inches thick. It has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 6. Some pedons have mottles in shades of red or brown. Texture is the same as in the B2t horizon but includes very cobbly clay loam or very cobbly sandy clay loam. Fragments of sandstone make up 55 to 75 percent by volume. Reaction is medium acid to very strongly acid.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 6. Some pedons have C horizons that are coarsely mottled in shades of brown, yellow, and gray. Texture is very gravelly fine sandy loam, very gravelly loam, very gravelly sandy clay loam, very gravelly clay loam, or their cobbly counterparts. Fragments of sandstone make up 55 to 85 percent by volume.

Wilburton Variant

The Wilburton Variant consists of deep, well drained, moderately permeable soils that formed in cherty outwash material. These nearly level to very gently sloping soils are on terraces or on outwash fans from the Potato Hills. They are variants to the Wilburton series because they contain less than 35 percent coarse fragments and have a thicker solum. In addition, the B horizon has hue of 10YR.

Wilburton Variant soils are associated with the Clodine Variant and Sobol, Tuskahoma, Wister, and Yanush soils. Clodine Variant soils are poorly drained and are in low areas between mounds. Sobol, Tuskahoma, and Wister soils are more clayey in the control section and are on higher areas of the landscape. Yanush soils have more than 35 percent coarse fragments in the control section.

The Wilburton Variant soils are fine-loamy, siliceous, thermic Ultic Hapludalfs.

Typical pedon of Wilburton Variant cherty loam in an area of Clodine Variant-Wilburton Variant complex, 0 to 3 percent slopes, 2,400 feet south and 400 feet east of the northwest corner of sec. 24, T. 3 N., R. 19 E.

A1—0 to 12 inches; brown (10YR 4/3) cherty loam; moderate medium granular structure; friable; fragments of chert make up 20 percent by volume; slightly acid; gradual smooth boundary.
B1—12 to 26 inches; dark yellowish brown (10YR 4/4) cherty loam; moderate medium subangular blocky structure; friable; fragments of chert make up 20 percent by volume; strongly acid; diffuse wavy boundary.
B2t—26 to 46 inches; yellowish brown (10YR 5/4) cherty clay loam; moderate medium subangular blocky structure; firm; clay films on faces of peds; fragments of chert make up 20 percent by volume; very strongly acid; diffuse wavy boundary.
B3—46 to 65 inches; brown (10YR 4/3) cherty loam; few fine distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable; fragments of chert make up 30 percent by volume; very strongly acid.

Solum thickness and depth to bedrock are more than 60 inches.

The A horizon is 6 to 19 inches thick. It has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. When the A1 horizon has value of 3 and chroma of 2 or 3, it is less than 7 inches thick. Fragments of chert make up 15 to 35 percent by volume. Reaction is slightly acid to strongly acid.

The B1 horizon is 6 to 17 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 4. Fragments of

chert make up 15 to 35 percent by volume. Reaction is medium acid to very strongly acid.

The B2t horizon is 12 to 24 inches thick. It has hue of 10YR, value of 5, and chroma of 4 to 6. Some pedons have mottles in shades of red, brown, and yellow. Texture is cherty clay loam or cherty silty clay loam. Fragments of chert make up 15 to 35 percent by volume. Reaction is medium acid to very strongly acid.

The B3 horizon is 10 to 20 inches thick. It has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. Mottles are in shades of red, brown, yellow, and gray. Texture is cherty loam, cherty clay loam, cherty silt loam, or cherty silty clay loam. Fragments of chert make up 15 to 35 percent by volume. Reaction is medium acid to very strongly acid.

Wing series

The Wing series consists of deep, moderately well drained, very slowly permeable soils formed in material weathered from shale. These very gently sloping soils are on uplands in broad valleys. They have a high content of sodium and are in low areas of the landscape.

Wing soils are associated with Counts, Stigler, and Tamaha soils. Counts soils are in similar areas but do not have a high percentage of sodium. Stigler and Tamaha soils have a thicker A horizon and are on higher areas of the landscape.

The soils of the Wing series are fine, mixed, thermic Aquic Natrustalfs.

Typical pedon of Wing silt loam in an area of Counts-Wing complex, 1 to 3 percent slopes, 2,200 feet south and 2,300 feet west of the northeast corner of sec. 35, T. 3 N., R. 21 E.

A1—0 to 6 inches; brown (10YR 4/3) silt loam; platy and weak granular structure; friable; medium acid; clear wavy boundary.

B21t—6 to 24 inches; dark yellowish brown (10YR 4/4) silty clay; common fine and medium faint grayish brown (10YR 5/2) and common fine and medium distinct yellowish red (5YR 4/6) mottles; weak columnar structure parting to moderate medium blocky; extremely firm; patchy clay films on faces of peds; very dark grayish brown (10YR 3/2) coatings on faces of peds; few dark brown concretions; neutral; gradual smooth boundary.

B22t—24 to 52 inches; yellowish brown (10YR 5/4) silty clay; common fine and medium faint brownish yellow (10YR 6/6) and common fine and medium distinct gray (10YR 6/1) mottles; weak columnar structure parting to moderate medium blocky; extremely firm; patchy clay films on faces of peds; dark grayish brown (10YR 4/2) coatings on faces of peds; common white patches of crystals; few dark brown concretions; mildly alkaline; diffuse wavy boundary.

B23t—52 to 72 inches; coarsely mottled yellowish brown (10YR 5/6) and gray (10YR 6/1) clay; weak medium blocky structure; extremely firm; patchy clay films on faces of peds; few dark brown concretions; common black streaks and stains; moderately alkaline.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Reaction is slightly acid or medium acid.

Some pedons have a thin A2 horizon. Where present, it is commonly 1 value and chroma higher than the A1 horizon and is similar in reaction and texture.

The B2t horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. Mottles are in shades of brown, gray, or red. Reaction is neutral to moderately alkaline.

The B23t horizon has colors similar to those of the B21t and B22t horizons or is coarsely mottled in shades of gray or brown.

The Wing soils in this survey area are considered taxadjuncts to the Wing series in that they have a slightly thicker solum and are slightly more clayey in the lower part of the B2t horizon.

Wister series

The Wister series consists of deep, moderately well drained, very slowly permeable soils that formed in material weathered from shale. These very gently sloping soils are on moundy uplands in broad valleys.

Wister soils are associated with Sobol and Tuskahoma soils. Sobol soils, which are on higher lying ridges, have a solum 20 to 40 inches thick. Tuskahoma soils, which are also on higher lying ridges, have a solum less than 20 inches thick.

The soils in the Wister series are fine, mixed, thermic Albaquic Hapludalfs.

Typical pedon of Wister silt loam, 1 to 3 percent slopes, 2,400 feet south and 300 feet west of the northeast corner of sec. 26, T. 3 N., R. 21 E.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; few fine faint dark brown mottles; moderate medium granular structure; friable; few fine black and yellowish brown concretions; medium acid; gradual smooth boundary.

A2—6 to 12 inches; grayish brown (10YR 5/2) silt loam; few medium distinct dark brown mottles; weak medium granular structure; friable; common black and yellowish brown concretions; strongly acid; clear wavy boundary.

B21t—12 to 24 inches; dark yellowish brown (10YR 4/4) clay; many medium distinct yellowish red (5YR 4/6), brown (10YR 5/3), and grayish brown (10YR 5/2) mottles; moderate medium blocky structure; very firm; many clay films on faces of peds; medium acid; gradual wavy boundary.

B22t—24 to 41 inches; yellowish brown (10YR 5/4) clay; common medium distinct brownish yellow (10YR 6/6) and grayish brown (10YR 5/2) mottles; moderate medium blocky structure; very firm;

common clay films on faces of peds; medium acid; diffuse wavy boundary.
B3—41 to 52 inches; light olive brown (2.5Y 5/4) clay; many coarse distinct yellowish brown (10YR 5/6) and gray (10YR 6/1) mottles; weak coarse blocky structure; very firm; fragments of shale make up 5 percent by volume; slightly acid; diffuse irregular boundary.
Cr—52 to 58 inches; olive gray (5Y 4/2) shale tilted 30 degrees from the horizontal; mildly alkaline.

Solum thickness and depth to bedrock range from 40 to 60 inches. The combined thickness of the A horizons is less than 20 inches. The boundary between the lower A horizon and the upper B horizon is clear or abrupt with an abrupt textural change.

The A1 horizon is 4 to 11 inches thick. It has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Reaction is medium acid to very strongly acid.

The A2 horizon is 0 to 11 inches thick. It has hue of 10YR, value of 5 or 6, and chroma of 2 to 6. Texture is loam or silt loam. Reaction is medium acid to very strongly acid.

The B21t horizon is 8 to 24 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is mottled in shades of red, brown, or gray. Texture is clay or silty clay. Reaction is medium acid to very strongly acid.

The B22t horizon is 10 to 24 inches thick. It has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 6. It is mottled in shades of red, brown, yellow, or gray. Texture is clay or silty clay. Reaction is medium acid to neutral.

The B3 horizon is 5 to 16 inches thick. It has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 6. Texture is clay or silty clay. Reaction is medium acid or neutral.

The Cr horizon is olive or gray shale that is tilted more than 20 degrees from horizontal.

Woodson Variant

The Woodson Variant consists of deep, moderately well drained, very slowly permeable soils formed from clayey sediments weathered from shale interbedded with limestone. These soils are on nearly level to very gently sloping areas adjacent to the Choctaw fault.

These soils are variants to the Woodson series because they have mixed mineralogy and do not have an abrupt boundary between the A horizon and B2t horizon.

Woodson Variant soils are associated with Counts, Sobol, Stigler, and Tamaha soils. Counts, Sobol, Stigler, and Tamaha soils do not have a mollic epipedon.

The Woodson Variant soils are fine, mixed, thermic Aquic Argiudolls.

Typical pedon of Woodson Variant silty clay loam, 0 to 3 percent slopes, 1,300 feet north and 1,300 feet east of the southwest corner of sec. 10, T. 4 N., R. 17 E.

A1—0 to 9 inches; very dark grayish brown (10YR 3/2) silty clay loam; common fine faint brown and light brownish gray mottles; moderate medium granular structure; friable; many roots; slightly acid; gradual smooth boundary.
B21t—9 to 26 inches; very dark grayish brown (10YR 3/2) clay; common fine faint mottles of dark brown and reddish brown; weak medium blocky structure; very firm; common roots; few clay films on faces of peds; slightly acid; gradual smooth boundary.
B22t—26 to 42 inches; very dark grayish brown (2.5Y 3/2) clay; weak medium blocky structure; few fine roots; very firm; few clay films on faces of peds; neutral; diffuse smooth boundary.
B3—42 to 62 inches; olive brown (2.5Y 4/4) clay; weak coarse blocky structure; very firm; few black concretions; moderately alkaline.

Solum thickness is more than 60 inches, and depth to bedrock is more than 60 inches.

The A horizon is 6 to 12 inches thick. It has hue of 10YR, value of 2 or 3, and chroma of 2 or 3. Reaction is medium acid to neutral.

The B21t horizon is 12 to 28 inches thick. It has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 2 to 4. It is clay or silty clay. Reaction is medium acid to neutral.

The B22t horizon is 12 to 24 inches thick. It has hue of 10YR to 5Y, value of 3 or 4, and chroma of 2 to 4. It is clay or silty clay. Reaction is slightly acid to moderately alkaline.

The B3 horizon is 12 to 24 inches thick. It has hue of 10YR to 5Y, value of 3 or 4, and chroma of 1 to 4. It is clay or silty clay. Reaction is neutral to moderately alkaline.

Yanush series

The Yanush series consists of deep, well drained, moderately permeable soils that formed in material weathered from cherty colluvial or alluvial sediments. These very gently sloping to steep soils are on outwash fans, terraces, and foot slopes of the Potato Hills.

Yanush soils are associated with Bigfork soils. Bigfork soils are on steeper areas of the landscape and have a solum that is 20 to 40 inches thick.

The soils of the Yanush series are loamy-skeletal, siliceous, thermic Typic Paleudalfs.

Typical pedon of Yanush cherty silt loam, 1 to 3 percent slopes, 100 feet west and 50 feet south of the northeast corner of sec. 21, T. 3 N., R. 21 E.

A1—0 to 11 inches; brown (7.5YR 4/4) cherty silt loam; moderate medium granular structure; friable; fragments of chert make up 20 percent by volume; slightly acid; gradual smooth boundary.
A2—11 to 18 inches; brown (7.5YR 5/4) cherty loam; moderate medium granular structure; friable; fragments of chert make up 25 percent by volume; medium acid; gradual smooth boundary.

B21t—18 to 30 inches; red (2.5YR 5/6) very cherty clay loam; weak medium subangular blocky structure; firm; patchy clay films on faces of peds; fragments of chert make up 55 percent by volume; strongly acid; gradual wavy boundary.

B22t—30 to 56 inches; red (2.5YR 4/6) very cherty clay loam; weak medium subangular blocky structure; firm; patchy clay films on faces of peds; fragments of chert make up 70 percent by volume; very strongly acid; diffuse wavy boundary.

B23t—56 to 72 inches; strong brown (7.5YR 5/6) very cherty clay loam; many medium prominent red (2.5YR 5/6) and gray (10YR 5/1) mottles; weak medium blocky structure; firm; patchy clay films on faces of peds; fragments of chert make up 50 percent by volume; few brown concretions; very strongly acid.

Solum thickness is more than 60 inches.

The A1 horizon is 4 to 11 inches thick. It has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. Chert fragments make up 25 to 40 percent by volume. Reaction is slightly acid or medium acid.

The A2 horizon is 4 to 12 inches thick. It has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 6. It is cherty silt loam or cherty loam. Chert fragments make up 25 to 50 percent by volume. Reaction is slightly acid to very strongly acid.

The B21t horizon is 4 to 24 inches thick. It has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 to 8. It is very cherty clay loam or very cherty silty clay loam. Chert fragments make up 35 to 80 percent by volume. Reaction is medium acid to very strongly acid.

The B22t and B23t horizons are 24 to 40 inches thick. They have hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 8. They are very cherty clay loam or very cherty silty clay loam. Chert fragments make up 35 to 85 percent by volume. Reaction is medium acid to very strongly acid.

formation of the soils

Soil is produced by the action of soil-forming processes on materials deposited or accumulated by geologic agencies. The characteristics of the soil at any given point are determined by (1) the physical and mineral composition of the parent material and the tilt of the bedrock; (2) the climate under which the soil material has accumulated and has existed since accumulation; (3) the plant and animal life on and in the soil; (4) the relief, or lay of the land; and (5) the length of time the forces of soil development have acted on the parent material. Few generalizations can be made regarding the effects of any one factor because the effects of each are modified by the other four.

parent material

Parent material is one of the most influential factors of soil formation in the county. It sets the limits of the chemical and mineral composition of the soil, and it influences the rate of soil development. Parent material is the unconsolidated material from which soil formed. Latimer County has several kinds of parent material, each of which produces a different kind of soil. For example, soils that formed in material weathered from shale, such as Wister soils, have a clayey subsoil. Those that formed in material weathered from sandstone, such as Pirum soils, have a loamy subsoil. Soils that formed in material weathered from interbedded shale and limestone, such as the Woodson Variant, have an adequate supply of bases.

climate

The humid, warm, temperate, continental climate of Latimer County is characterized by high-intensity rainfall. Moisture and warm temperatures have promoted the formation of distinct horizons in many of the soils. Differences among soils, however, cannot be attributed to climate because the climate is uniform throughout the county. Heavy rains have caused rapid runoff that has eroded some of the soils. This erosion is an indirect effect of climate.

plants and animals

Plants, burrowing animals, insects, and soil micro-organisms have a direct influence on the formation of the soil. Native vegetation, such as trees or grasses, or both, has a bearing on the amount of organic matter and on the amounts and kinds of plant nutrients in the soil and on the type of soil structure and consistence. The soils of the Woodson Variant, for example, formed under native grasses. The deep, fibrous roots of these native grasses recycle soil nutrients and promote granular structure and high organic matter content. Consequently, the soils that formed under grass in Latimer County tend to have more bases and organic matter than the soils that formed under trees. Carnasaw soils, which formed under trees, are lower in plant nutrients and organic matter content than soils that formed under grass.

During the past century, man has altered soil formation by removing the native vegetation over much of the county. Lack of adequate conservation measures has resulted in much soil loss through sheet and gully erosion. Where erosion has removed some of the surface layer and gullies have formed, eroded phases of soils are mapped. An example is Shermore fine sandy loam, 2 to 5 percent slopes, eroded.

relief

Relief affects soil formation through its influence on moisture, drainage, erosion, temperature, and plant cover. The relief of Latimer County is determined largely by the resistance of underlying parent material to weathering and geological erosion.

The effects of relief on soil formation are illustrated by Tamaha and Clebit soils. Tamaha soils generally are in less sloping areas. Surface runoff is less, and more water percolates through these soils to influence the loss, gain, or transfer of soil constituents. Clebit soils typically are more sloping, and they have a less clearly defined profile than Tamaha soils. On the more sloping soils, much rainwater runs off instead of moving through the soil to help form a deeper solum.

time

Time as a factor cannot be measured strictly in years. The length of time needed for the development of genetic horizons depends on the interaction of the other soil-forming factors. Soils that do not have definite horizons are young or immature. Mature soils have approached equilibrium with their environment and tend to have a well defined horizon of clay accumulation.

The soils of Latimer County range from young to old. Some of the mature soils are those of the Counts and

Stigler series on uplands. Neff and Rexor soils are younger; they have clearly defined horizons. Clebit soils are young soils that have had sufficient time to develop clearly defined horizons, but geological erosion on these sloping soils has taken away soil material almost as fast as it has formed. Dela and Ceda soils, on flood plains, have been developing for such a short time that they show little horizon development.

processes of soil formation

Processes that have influenced the formation of horizons in the soils of Latimer County are accumulation of organic matter, leaching of calcium carbonate and bases, and translocation of silicate clay minerals. In most soils, more than one of these processes have been active in the development of horizons.

The addition of organic matter to the surface layer by native grasses has contributed to the granular structure. The surface layer is high in content of organic matter in soils such as those of the Woodson Variant. It is called a mollic epipedon. Carnasaw soils formed under trees and contain less organic matter than the Woodson Variant. Their surface layer is called an ochric epipedon.

Leaching of carbonates and bases is active in the formation of soils. The accumulation of bases in the lower part of the B horizon of the Woodson Variant indicates the depth to which water has percolated. Carnasaw soils have been leached to the extent that they lack accumulation of calcium carbonates. More bases have been leached from the B horizon of these soils, and this is reflected by their base saturation. Soils on flood plains, such as Ceda soils, are recharged with bases when flooding occurs. The more acid Dela soils have not been leached, but they receive neutral to acid sediments.

The degree of translocation of silicate clay minerals is a very important factor in establishing the properties and classification of soils. Clay films on ped surfaces and bridging sand grains and illuvial accumulation of clay are evidence of an argillic horizon. Many soils, including Carnasaw and Sallisaw soils, have an argillic horizon. Variation in degree of translocation of silicate clay minerals and in the kind of parent material has resulted in wide variation in the texture and other properties of the argillic horizon in different soils.

Grasses bring bases to the surface, and this retards leaching and the formation of an A2 horizon. Geologic erosion on soils such as Clebit soils hinders horizon development. The sediment on Dela and Ceda soils on flood plains was deposited so recently that there has not been enough time for the formation of horizons.

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glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	More than 12

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected

scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the

surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.
R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05

millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-76 at Wilburton, Oklahoma]

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days[1]	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	52.8	27.8	40.3	76	1	17	1.86	.78	2.72	4	2.0
February	57.8	32.0	44.9	79	7	46	2.61	1.01	3.89	5	1.8
March	64.9	38.8	51.9	87	15	178	4.00	1.99	5.63	6	.6
April	74.9	49.5	62.2	89	26	371	5.31	2.42	7.66	7	.0
May	81.7	56.8	69.3	92	36	598	5.46	2.93	7.52	7	.0
June	89.2	64.9	77.1	100	46	813	3.80	1.51	5.65	6	.0
July	94.8	68.7	81.8	107	54	986	4.44	1.44	6.83	5	.0
August	94.6	66.5	80.6	107	51	949	3.33	1.48	4.83	5	.0
September	87.3	59.7	73.6	101	40	708	5.05	2.20	7.36	6	.0
October	77.1	48.6	62.9	94	27	408	3.86	.84	6.22	4	.0
November	63.8	37.7	50.8	83	13	120	3.55	1.26	5.39	5	.3
December	55.2	30.7	43.0	75	5	25	3.02	1.41	4.36	5	.7
Yearly:											
Average	74.5	48.5	61.5	---	---	---	---	---	---	---	---
Extreme	---	---	---	110	-2	---	---	---	---	---	---
Total	---	---	---	---	---	5,219	46.29	34.91	56.42	65	5.4

[1] A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-76 at Wilburton, Oklahoma]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 26	April 12	April 26
2 years in 10 later than--	March 21	April 8	April 20
5 years in 10 later than--	March 13	March 31	April 9
First freezing temperature in fall:			
1 year in 10 earlier than--	October 28	October 20	October 11
2 years in 10 earlier than--	November 3	October 25	October 16
5 years in 10 earlier than--	November 14	November 4	October 25

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-76 at Wilburton, Oklahoma]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	222	198	176
8 years in 10	230	204	183
5 years in 10	245	217	198
2 years in 10	260	230	212
1 year in 10	268	236	220

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Bengal-Clebit complex, 3 to 8 percent slopes	6,392	1.4
2	Bengal-Denman association, moderately steep	35,394	7.5
3	Bigfork-Yanush association, steep	7,795	1.7
4	Carnasaw-Clebit association, moderately steep	118,310	25.1
5	Carnasaw-Clebit-Pickens Variant association, steep	7,385	1.6
6	Carnasaw-Clebit-Rock outcrop complex, 3 to 8 percent slopes	10,300	2.2
7	Carnasaw-Pirum complex, 3 to 8 percent slopes	4,145	0.9
8	Carnasaw-Pirum-Clebit association, strongly sloping	53,890	11.4
9	Ceda cherty silt loam, occasionally flooded	760	0.2
10	Ceda cherty silt loam, frequently flooded	930	0.2
11	Ceda-Rubble land complex	10,427	2.2
12	Clebit-Pirum complex, 5 to 12 percent slopes	3,385	0.7
13	Clebit-Pirum-Rock outcrop complex, 15 to 40 percent slopes	3,540	0.8
14	Clodine Variant-Wilburton Variant complex, 0 to 3 percent slopes	1,410	0.3
15	Counts silt loam, 0 to 1 percent slopes	2,805	0.6
16	Counts silt loam, 1 to 3 percent slopes	7,020	1.5
17	Counts-Rexor complex, 0 to 12 percent slopes	2,780	0.6
18	Counts-Wing complex, 1 to 3 percent slopes	1,905	0.4
19	Cupco silt loam	9,405	2.0
20	Dela fine sandy loam	1,285	0.3
21	Denman-Carnasaw association, steep	39,780	8.4
22	Freestone Variant-Bernow Variant complex, 0 to 2 percent slopes	2,910	0.6
23	Kanima shaly silty clay loam, 30 to 50 percent slopes	1,050	0.2
24	Kenn-Ceda complex, 0 to 2 percent slopes	583	0.1
25	Neff silt loam	9,053	1.9
26	Neff and Rexor silt loams	13,505	2.9
27	Octavia-Carnasaw-Clebit association, cool, steep	2,965	0.6
28	Pirum fine sandy loam, 1 to 3 percent slopes	600	0.1
29	Pirum fine sandy loam, 3 to 5 percent slopes	1,080	0.2
30	Pirum-Carnasaw-Panama association, steep	14,195	3.0
31	Rexor silt loam	5,170	1.1
32	Sallisaw loam, 1 to 3 percent slopes	4,510	1.0
33	Shermore fine sandy loam, 1 to 3 percent slopes	1,500	0.3
34	Shermore fine sandy loam, 3 to 5 percent slopes	10,073	2.1
35	Shermore fine sandy loam, 2 to 5 percent slopes, eroded	890	0.2
36	Sobol silt loam, 2 to 5 percent slopes	2,900	0.6
37	Sobol-Rock outcrop complex, 5 to 20 percent slopes	3,155	0.7
38	Stigler silt loam, 0 to 1 percent slopes	4,445	0.9
39	Stigler silt loam, 1 to 3 percent slopes	14,147	3.0
40	Tamaha silt loam, 1 to 3 percent slopes	2,195	0.5
41	Tamaha silt loam, 3 to 5 percent slopes	3,053	0.6
42	Tuskahoma-Sobol complex, 3 to 8 percent slopes	6,490	1.4
43	Tuskahoma-Sobol complex, 8 to 20 percent slopes	13,400	2.8
44	Wilburton cobbly loam, 2 to 8 percent slopes	4,465	0.9
45	Wilburton cobbly loam, 8 to 20 percent slopes	3,268	0.7
46	Wister silt loam, 1 to 3 percent slopes	3,710	0.8
47	Woodson Variant silty clay loam, 0 to 3 percent slopes	760	0.2
48	Yanush cherty silt loam, 1 to 3 percent slopes	1,440	0.3
49	Yanush cherty silt loam, 3 to 8 percent slopes	2,025	0.4
50	Yanush cherty silt loam, 8 to 20 percent slopes	3,645	0.8
51	Yanush-Sobol complex, 5 to 20 percent slopes	4,815	1.0
	Water	640	0.1
	Total	471,680	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Wheat	Grain sorghum	Soybeans	Improved bermudagrass	Tall fescue	Bahiagrass
	Bu	Bu	Bu	AUM*	AUM*	AUM*
1---- Bengal-Clebit	---	---	---	---	---	---
2**:						
Bengal----	---	---	---	---	---	---
Denman----	---	---	---	---	---	---
3**:						
Bigfork----	---	---	---	---	---	---
Yanush----	---	---	---	---	---	---
4**:						
Carnasaw----	---	---	---	---	---	---
Clebit----	---	---	---	---	---	---
5**:						
Carnasaw----	---	---	---	---	---	---
Clebit----	---	---	---	---	---	---
Pickens Variant----	---	---	---	---	---	---
6---- Carnasaw-Clebit-Rock outcrop	---	---	---	---	---	---
7---- Carnasaw-Pirum	15	30	15	5.5	3.5	4.0
8**:						
Carnasaw----	---	---	---	---	---	---
Pirum----	---	---	---	---	---	---
Clebit----	---	---	---	---	---	---
9---- Ceda	15	30	15	4.0	3.5	3.0
10---- Ceda	---	---	---	---	---	---
11---- Ceda-Rubble land	---	---	---	---	---	---
12---- Clebit-Pirum	---	---	---	4.5	---	3.5
13---- Clebit-Pirum-Rock outcrop	---	---	---	---	---	---
14---- Clodine Variant-Wilburton Variant	20	30	15	6.0	4.5	4.0
15---- Counts	35	45	30	7.5	6.0	5.5
16---- Counts	30	40	25	7.0	5.5	5.5

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Wheat	Grain sorghum	Soybeans	Improved bermudagrass	Tall fescue	Bahiagrass
	Bu	Bu	Bu	AUM*	AUM*	AUM*
17--- Counts-Rexor	---	---	---	6.0	4.5	4.5
18--- Counts-Wing	15	25	15	4.0	2.5	3.0
19--- Cupco	30	50	25	7.5	6.0	6.0
20--- Dela	35	65	30	8.0	6.5	6.5
21**:						
Denman---	---	---	---	---	---	---
Carnasaw---	---	---	---	---	---	---
22--- Freestone Variant-Bernow Variant	30	40	25	7.0	5.0	5.5
23--- Kanima	---	---	---	---	---	---
24--- Kenn-Ceda	15	30	15	6.0	4.5	4.5
25--- Neff	30	60	30	8.0	6.5	6.0
26--- Neff and Rexor	---	---	---	8.0	6.5	6.0
27**:						
Octavia---	---	---	---	---	---	---
Carnasaw---	---	---	---	---	---	---
Clebit---	---	---	---	---	---	---
28--- Pirum	30	45	25	7.5	5.0	5.5
29--- Pirum	25	40	20	7.0	4.5	5.0
30**:						
Pirum---	---	---	---	---	---	---
Carnasaw---	---	---	---	---	---	---
Panama---	---	---	---	---	---	---
31--- Rexor	35	70	30	8.5	6.5	6.5
32--- Sallisaw	30	45	25	7.5	5.0	5.5
33--- Shermore	30	50	25	7.5	5.0	5.5
34--- Shermore	25	45	20	7.0	4.5	5.0
35--- Shermore	20	40	15	6.0	4.0	4.5
36--- Sobol	25	35	20	6.0	4.0	5.0

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Wheat	Grain sorghum	Soybeans	Improved bermudagrass	Tall fescue	Bahiagrass
	Bu	Bu	Bu	AUM*	AUM*	AUM*
37--- Sobol-Rock outcrop	---	---	---	---	---	---
38--- Stigler	35	50	30	8.0	6.5	7.0
39--- Stigler	35	45	30	8.0	6.0	6.0
40--- Tamaha	30	40	25	7.5	5.5	6.0
41--- Tamaha	25	35	20	7.0	5.0	5.5
42--- Tuskahoma-Sobol	---	---	---	4.5	3.0	3.5
43--- Tuskahoma-Sobol	---	---	---	---	---	---
44--- Wilburton	20	30	15	5.5	4.0	4.0
45--- Wilburton	---	---	---	4.5	3.0	3.5
46--- Wister	30	40	25	7.0	5.5	5.5
47--- Woodson Variant	30	50	25	7.0	5.5	5.5
48--- Yanush	30	45	25	6.5	4.5	5.0
49--- Yanush	25	35	20	5.5	3.5	4.0
50--- Yanush	---	---	---	4.0	2.5	3.0
51--- Yanush-Sobol	---	---	---	3.5	2.0	2.5

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

[Only the soils that support rangeland vegetation suitable for grazing are listed]

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
1*:					
Bengal	Sandy Savannah	Favorable	4,000	Little bluestem	25
		Normal	2,800	Big bluestem	10
		Unfavorable	2,000	Indiangrass	10
				Switchgrass	5
Clebit	Shallow Savannah	Favorable	3,500	Little bluestem	35
		Normal	2,200	Big bluestem	10
		Unfavorable	1,900	Indiangrass	5
2*:					
Bengal	Sandy Savannah	Favorable	4,000	Little bluestem	25
		Normal	2,800	Big bluestem	10
		Unfavorable	2,000	Indiangrass	10
				Switchgrass	5
Denman	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Switchgrass	5
				Indiangrass	5
3*:					
Bigfork	Steep Chert Savannah	Favorable	3,500	Little bluestem	25
		Normal	2,600	Big bluestem	15
		Unfavorable	2,000	Indiangrass	10
				Beaked panicum	5
				Scribner panicum	5
Yanush	Steep Chert Savannah	Favorable	3,500	Little bluestem	25
		Normal	2,600	Big bluestem	15
		Unfavorable	2,000	Indiangrass	10
				Beaked panicum	5
				Scribner panicum	5
4*:					
Carnasaw	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Indiangrass	10
				Switchgrass	5
Clebit	Shallow Savannah	Favorable	3,500	Little bluestem	35
		Normal	2,200	Big bluestem	10
		Unfavorable	1,900	Indiangrass	5
				Switchgrass	5
5*:					
Carnasaw	Savannah Breaks	Favorable	3,500	Little bluestem	40
		Normal	2,400	Big bluestem	5
		Unfavorable	1,700		
Clebit	Savannah Breaks	Favorable	2,800	Little bluestem	40
		Normal	2,000	Big bluestem	5
		Unfavorable	1,400		
Pickens Variant	Savannah Breaks	Favorable	2,400	Little bluestem	30
		Normal	1,600	Big bluestem	20
		Unfavorable	1,000	Indiangrass	5
				Switchgrass	5
6*:					
Carnasaw	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Indiangrass	10
				Switchgrass	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
6*:					
Clebit	Shallow Savannah	Favorable	3,500	Little bluestem	35
		Normal	2,200	Big bluestem	10
		Unfavorable	1,900	Indiangrass	5
				Switchgrass	5
Rock outcrop.					
7*:					
Carnasaw	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Indiangrass	10
				Switchgrass	5
Pirum	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Indiangrass	10
				Switchgrass	5
8*:					
Carnasaw	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Indiangrass	10
				Switchgrass	5
Pirum	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Indiangrass	10
				Switchgrass	5
Clebit	Shallow Savannah	Favorable	3,500	Little bluestem	35
		Normal	2,200	Big bluestem	10
		Unfavorable	1,900	Indiangrass	5
				Switchgrass	5
12*:					
Clebit	Shallow Savannah	Favorable	3,500	Little bluestem	35
		Normal	2,200	Big bluestem	10
		Unfavorable	1,900	Indiangrass	5
				Switchgrass	5
Pirum	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Indiangrass	10
				Switchgrass	5
13*:					
Clebit	Shallow Savannah	Favorable	3,500	Little bluestem	35
		Normal	2,200	Big bluestem	10
		Unfavorable	1,900	Indiangrass	5
				Switchgrass	5
Pirum	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Indiangrass	10
				Switchgrass	5
Rock outcrop.					
15, 16	Loamy Savannah	Favorable	5,000	Big bluestem	25
Counts		Normal	3,500	Indiangrass	15
		Unfavorable	2,500	Little bluestem	10
17*:					
Counts	Loamy Savannah	Favorable	5,000	Big bluestem	25
		Normal	3,500	Indiangrass	15
		Unfavorable	2,500	Little bluestem	10
Rexor.					

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
18*:					
Counts	Loamy Savannah	Favorable	5,000	Big bluestem	25
		Normal	3,500	Indiangrass	15
		Unfavorable	2,500	Little bluestem	10
Wing	Slickspot	Favorable	3,500	Switchgrass	15
		Normal	2,400	Little bluestem	15
		Unfavorable	1,700	Indiangrass	10
				Threeawn	10
				Paspalum	5
				Dropseed	5
				Sedge	5
21*:					
Denman	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Switchgrass	5
				Indiangrass	5
Carnasaw	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Indiangrass	10
				Switchgrass	5
27*:					
Octavia	Savannah Breaks	Favorable	3,500	Little bluestem	40
		Normal	2,400	Big bluestem	5
		Unfavorable	1,700	Switchgrass	5
				Indiangrass	5
Carnasaw	Savannah Breaks	Favorable	3,500	Little bluestem	40
		Normal	2,400	Big bluestem	5
		Unfavorable	1,700		
Clebit	Savannah Breaks	Favorable	2,800	Little bluestem	40
		Normal	2,000	Big bluestem	5
		Unfavorable	1,400		
28, 29 Pirum	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Indiangrass	10
				Switchgrass	5
30*:					
Pirum	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Indiangrass	10
				Switchgrass	5
Carnasaw	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Indiangrass	10
				Switchgrass	5
Panama	Sandy Savannah	Favorable	4,500	Little bluestem	25
		Normal	3,200	Big bluestem	15
		Unfavorable	2,500	Indiangrass	10
				Switchgrass	5
36 Sobol	Loamy Prairie	Favorable	4,000	Big bluestem	35
		Normal	2,800	Switchgrass	15
		Unfavorable	2,000	Little bluestem	10
				Indiangrass	10
				Scribner panicum	5
				Tall dropseed	5

See footnote at end of table.

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
37*:					
Sobol	Loamy Prairie	Favorable	4,000	Big bluestem	35
		Normal	2,800	Switchgrass	15
		Unfavorable	2,000	Little bluestem	10
				Indiangrass	10
				Scribner panicum	5
				Tall dropseed	5
Rock outcrop.					
38, 39	Loamy Savannah	Favorable	5,000	Big bluestem	25
Stigler		Normal	3,500	Indiangrass	15
		Unfavorable	2,500	Little bluestem	10
40, 41	Loamy Savannah	Favorable	5,000	Big bluestem	25
Tamaha		Normal	3,500	Indiangrass	15
		Unfavorable	2,500	Little bluestem	10
42*:					
Tuskahoma	Shallow Savannah	Favorable	3,200	Little bluestem	30
		Normal	2,400	Big bluestem	20
		Unfavorable	1,800	Indiangrass	5
				Switchgrass	5
Sobol	Loamy Prairie	Favorable	4,000	Big bluestem	35
		Normal	2,800	Switchgrass	15
		Unfavorable	2,000	Little bluestem	10
				Indiangrass	10
				Scribner panicum	5
				Tall dropseed	5
43*:					
Tuskahoma	Shallow Savannah	Favorable	3,200	Little bluestem	30
		Normal	2,400	Big bluestem	20
		Unfavorable	1,800	Indiangrass	5
				Switchgrass	5
Sobol	Loamy Prairie	Favorable	4,000	Big bluestem	35
		Normal	2,800	Switchgrass	15
		Unfavorable	2,000	Little bluestem	10
				Indiangrass	10
				Scribner panicum	5
				Tall dropseed	5
44, 45	Sandy Savannah	Favorable	4,000	Little bluestem	25
Wilburton		Normal	3,000	Big bluestem	15
		Unfavorable	2,100	Indiangrass	10
				Switchgrass	5
46	Claypan Prairie	Favorable	5,000	Big bluestem	35
Wister		Normal	3,500	Switchgrass	15
		Unfavorable	2,500	Little bluestem	10
				Indiangrass	10
				Scribner panicum	5
				Tall dropseed	5
47	Loamy Savannah	Favorable	5,000	Big bluestem	25
Woodson Variant		Normal	3,500	Indiangrass	15
		Unfavorable	2,500	Little bluestem	10
48, 49, 50	Smooth Chert Savannah	Favorable	3,800	Little bluestem	25
Yanush		Normal	2,800	Big bluestem	15
		Unfavorable	2,200	Indiangrass	10
				Beaked panicum	5
				Scribner panicum	5

TABLE 6.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
51*:					
Yanush	Smooth Chert Savannah	Favorable	3,800	Little bluestem	25
		Normal	2,800	Big bluestem	15
		Unfavorable	2,200	Indiangrass	10
				Beaked panicum	5
				Scribner panicum	5
Sobol	Loamy Prairie	Favorable	4,000	Big bluestem	35
		Normal	2,800	Switchgrass	15
		Unfavorable	2,000	Little bluestem	10
				Indiangrass	10
				Scribner panicum	5
				Tall dropseed	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Dashes indicate that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant*
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
1**:							
Bengal	5x	Slight	Moderate	Slight	Shortleaf pine	50	
					Blackjack oak	---	
					Post oak	---	
Clebit	5x	Slight	Moderate	Severe	Shortleaf pine	40	
					Eastern redcedar	30	
					Post oak	---	
					Blackjack oak	---	
					Winged elm	---	
2**:							
Bengal	5x	Slight	Moderate	Slight	Shortleaf pine	50	
					Blackjack oak	---	
					Post oak	---	
Denman	4x	Moderate	Moderate	Slight	Shortleaf pine	60	Shortleaf pine, loblolly pine.
					Southern red oak	60	
					Hickory	---	
					Post oak	---	
3**:							
Bigfork	5x	Moderate	Moderate	Moderate	Shortleaf pine	40	
					Post oak	---	
					Blackjack oak	---	
Yanush	5x	Moderate	Moderate	Moderate	Shortleaf pine	50	
					Post oak	---	
					Southern red oak	---	
4**:							
Carnasaw	4x	Moderate	Moderate	Slight	Shortleaf pine	60	Loblolly pine, shortleaf pine.
					Southern red oak	60	
Clebit	5x	Slight	Moderate	Severe	Shortleaf pine	40	
					Eastern redcedar	30	
					Post oak	---	
					Blackjack oak	---	
					Winged elm	---	
5**:							
Carnasaw	5x	Severe	Severe	Slight	Southern red oak	50	
					Hickory	---	
					Shortleaf pine	50	
					White oak	---	
					Blackjack oak	---	
					Post oak	---	
Clebit	5x	Moderate	Severe	Severe	Shortleaf pine	40	
					Eastern redcedar	30	
					Post oak	---	
					Blackjack oak	---	
					Winged elm	---	
Pickens Variant	5x	Moderate	Severe	Severe	Eastern redcedar	30	
					Post oak	---	
					Blackjack oak	---	
					Winged elm	---	
6**:							
Carnasaw	4x	Slight	Moderate	Slight	Shortleaf pine	60	Loblolly pine, shortleaf pine.
					Southern red oak	60	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant*
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
6**:							
Clebit	5x	Slight	Moderate	Severe	Shortleaf pine	40	
					Eastern redcedar	30	
					Post oak	---	
					Blackjack oak	---	
					Winged elm	---	
Rock outcrop.							
7**:							
Carnasaw	4o	Slight	Slight	Slight	Shortleaf pine	60	Loblolly pine,
					Southern red oak	60	shortleaf pine.
Pirum	4o	Slight	Slight	Slight	Shortleaf pine	60	Shortleaf pine,
					Southern red oak	60	loblolly pine.
					White oak	60	
8**:							
Carnasaw	4x	Slight	Moderate	Slight	Shortleaf pine	60	Shortleaf pine,
					Southern red oak	60	loblolly pine.
Pirum	4x	Slight	Moderate	Slight	Shortleaf pine	60	Shortleaf pine,
					Southern red oak	60	loblolly pine.
					White oak	60	
Clebit	5x	Slight	Moderate	Severe	Shortleaf pine	40	
					Eastern redcedar	30	
					Post oak	---	
					Blackjack oak	---	
					Winged elm	---	
9, 10	3f	Slight	Slight	Moderate	Shortleaf pine	70	Loblolly pine,
Ceda					Southern red oak	---	shortleaf pine,
					White oak	---	American sycamore,
					American sycamore	80	sweetgum.
11**:							
Ceda	3f	Slight	Slight	Moderate	Shortleaf pine	70	Loblolly pine,
					Southern red oak	---	shortleaf pine,
					White oak	---	American sycamore,
					American sycamore	80	sweetgum.
Rubble land.							
12**:							
Clebit	5d	Slight	Slight	Severe	Shortleaf pine	40	
					Eastern redcedar	30	
					Post oak	---	
					Blackjack oak	---	
					Winged elm	---	
Pirum	4o	Slight	Slight	Slight	Shortleaf pine	60	Shortleaf pine,
					Southern red oak	60	loblolly pine.
					White oak	60	
13**:							
Clebit	5x	Moderate	Severe	Severe	Shortleaf pine	40	
					Eastern redcedar	30	
					Post oak	---	
					Blackjack oak	---	
					Winged elm	---	
Pirum	4x	Severe	Moderate	Slight	Southern red oak	60	Shortleaf pine,
					Shortleaf pine	60	loblolly pine.
					White oak	60	
Rock outcrop.							

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant*
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
14**:							
Clodine Variant---	3w	Slight	Severe	Severe	Green ash----------	---	Shortleaf pine, loblolly pine, green ash, sweetgum.
					Water oak----------	80	
					Willow oak----------	---	
Wilburton Variant-	3o	Slight	Slight	Slight	Southern red oak-------	70	Shortleaf pine, loblolly pine, southern red oak.
					Shortleaf pine---------	70	
					White oak----------	---	
15, 16---------- Counts	4o	Slight	Slight	Slight	Southern red oak-------	60	Shortleaf pine, loblolly pine.
					Eastern redcedar-------	40	
					Post oak----------	---	
					Blackjack oak----------	---	
17**:							
Counts----------	4o	Slight	Slight	Slight	Southern red oak-------	60	Shortleaf pine, loblolly pine.
					Eastern redcedar-------	40	
					Post oak----------	---	
					Blackjack oak----------	---	
Rexor----------	2o	Slight	Slight	Slight	Shortleaf pine---------	80	Loblolly pine, sweetgum, black walnut.
					White oak----------	---	
					Southern red oak-------	---	
					Black walnut----------	---	
18**:							
Counts----------	4o	Slight	Slight	Slight	Southern red oak-------	60	Shortleaf pine, loblolly pine.
					Eastern redcedar-------	40	
					Post oak----------	---	
					Blackjack oak----------	---	
Wing.							
19---------- Cupco	3w	Slight	Severe	Severe	Green ash----------	---	Shortleaf pine, loblolly pine, green ash, sweetgum.
					Water oak----------	80	
					Willow oak----------	---	
20---------- Dela	2o	Slight	Slight	Slight	Southern red oak-------	80	Loblolly pine, shortleaf pine, black walnut, southern red oak.
					Eastern cottonwood-----	100	
					Shortleaf pine---------	80	
					Green ash----------	---	
					Hickory----------	---	
21**:							
Denman----------	4x	Moderate	Moderate	Slight	Shortleaf pine---------	60	Shortleaf pine, loblolly pine.
					Southern red oak-------	60	
					Hickory----------	---	
					Post oak----------	---	
Carnasaw----------	4x	Moderate	Moderate	Slight	Shortleaf pine---------	60	Shortleaf pine, loblolly pine.
					Southern red oak-------	---	
22**:							
Freestone Variant-	3w	Slight	Moderate	Moderate	Shortleaf pine---------	---	Shortleaf pine, loblolly pine, green ash.
					Southern red oak-------	70	
					Common hackberry-------	---	
					Green ash----------	---	
					American elm----------	---	
Bernow Variant----	3o	Slight	Slight	Slight	Shortleaf pine---------	---	Shortleaf pine, loblolly pine, black walnut.
					Southern red oak-------	75	
					Common hackberry-------	---	
					Green ash----------	---	
					American elm----------	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant*
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
24**:							
Kenn	3o	Slight	Slight	Slight	Shortleaf pine Southern red oak Post oak	70 70 ---	Shortleaf pine, loblolly pine.
Ceda	3f	Slight	Slight	Moderate	Shortleaf pine Southern red oak White oak American sycamore	70 --- --- 80	Loblolly pine, shortleaf pine, American sycamore, sweetgum.
25 Neff	3w	Slight	Moderate	Moderate	Water oak Willow oak Green ash	80 80 ---	Eastern cottonwood, loblolly pine, sweetgum, green ash, shortleaf pine.
26**:							
Neff	3w	Slight	Moderate	Moderate	Water oak Willow oak Green ash	80 80 ---	Eastern cottonwood, loblolly pine, sweetgum, green ash, shortleaf pine.
Rexor	2o	Slight	Slight	Slight	Shortleaf pine White oak Southern red oak Black walnut	80 --- --- ---	Loblolly pine, sweetgum, black walnut.
27**:							
Octavia	4x	Severe	Moderate	Slight	Shortleaf pine Southern red oak Hickory White oak	60 60 --- ---	Loblolly pine, shortleaf pine.
Carnasaw	4x	Severe	Moderate	Slight	Shortleaf pine Southern red oak Hickory White oak Blackjack oak Post oak	60 60 --- --- --- ---	Shortleaf pine, loblolly pine.
Clebit	5x	Moderate	Moderate	Severe	Winged elm Shortleaf pine Eastern red cedar Post oak Blackjack oak	--- 40 30 --- ---	
28, 29 Pirum	4o	Slight	Slight	Slight	Shortleaf pine Southern red oak White oak Eastern redcedar	60 60 --- ---	Shortleaf pine, loblolly pine.
30**:							
Pirum	4x	Moderate	Moderate	Slight	Shortleaf pine White oak Southern red oak	60 60 60	Shortleaf pine, loblolly pine, southern red oak.
Carnasaw	4x	Moderate	Moderate	Slight	Shortleaf pine Southern red oak	60 60	Loblolly pine, shortleaf pine.
Panama	4x	Slight	Moderate	Slight	Shortleaf pine White oak Southern red oak Hickory	60 --- 60 ---	Shortleaf pine, loblolly pine.
31 Rexor	2o	Slight	Slight	Slight	Shortleaf pine White oak Southern red oak Black walnut	80 --- --- ---	Loblolly pine, sweetgum, black walnut.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant*
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
32---------- Sallisaw	3o	Slight	Slight	Slight	Shortleaf pine--------- Southern red oak------- Common hackberry-------- American elm---------- Green ash----------	66 --- --- --- ---	Shortleaf pine, loblolly pine, black walnut, cherrybark oak.
33, 34, 35--------- Shermore	3o	Slight	Slight	Slight	Shortleaf pine--------- Southern red oak------- Post oak---------- White oak---------- Hickory----------	70 70 --- --- ---	Loblolly pine, shortleaf pine.
38, 39---------- Stigler	4o	Slight	Slight	Slight	Post oak---------- Blackjack oak---------- Southern red oak-------	--- --- 60	Shortleaf pine, loblolly pine.
40, 41---------- Tamaha	4o	Slight	Slight	Slight	Post oak---------- Blackjack oak---------- Southern red oak-------	--- --- 60	Shortleaf pine, loblolly pine.
42**: Tuskahoma--------- Sobol.	5d	Slight	Slight	Moderate	Winged elm---------- Eastern redcedar------- Post oak---------- Blackjack oak----------	--- 30 --- ---	
43**: Tuskahoma--------- Sobol.	5x	Severe	Moderate	Moderate	Eastern redcedar------- Winged elm---------- Post oak---------- Blackjack oak----------	30 --- --- ---	
44---------- Wilburton	4f	Slight	Slight	Moderate	Eastern redcedar------- Shortleaf pine--------- Hickory---------- Post oak---------- Blackjack oak----------	40 60 --- --- ---	Shortleaf pine, loblolly pine.
45---------- Wilburton	4f	Slight	Moderate	Moderate	Shortleaf pine--------- Eastern redcedar------- Hickory---------- Post oak---------- Blackjack oak----------	60 40 --- --- ---	Shortleaf pine, loblolly pine.
47---------- Woodson Variant	4o	Slight	Slight	Slight	Southern red oak------- Post oak---------- Blackjack oak----------	60 --- ---	Shortleaf pine, loblolly pine.
48, 49---------- Yanush	4f	Slight	Slight	Moderate	Shortleaf pine--------- Post oak---------- Southern red oak-------	60 --- ---	Shortleaf pine, loblolly pine.
50---------- Yanush	5f	Moderate	Moderate	Moderate	Shortleaf pine--------- Post oak---------- Southern red oak-------	50 --- ---	
51**: Yanush---------- Sobol.	5f	Moderate	Moderate	Moderate	Shortleaf pine--------- Post oak---------- Southern red oak-------	50 --- ---	

* For soils that have a low site index, no trees are recommended for planting.
** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WOODLAND UNDERSTORY VEGETATION

[Only the soils suitable for production of commercial trees are listed]

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
1*:				
Bengal	Favorable	1,500	Little bluestem	15
	Normal	1,200	Big bluestem	10
	Unfavorable	1,000	Indiangrass	5
			Switchgrass	5
Clebit	Favorable	1,600	Little bluestem	20
	Normal	1,100	Big bluestem	5
	Unfavorable	800		
2*:				
Bengal	Favorable	1,500	Little bluestem	15
	Normal	1,200	Big bluestem	10
	Unfavorable	1,000	Indiangrass	5
			Switchgrass	5
Denman	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5
3*:				
Bigfork	Favorable	3,000	Little bluestem	35
	Normal	1,400	Big bluestem	10
	Unfavorable	1,000	Beaked panicum	10
			Scribner panicum	10
Yanush	Favorable	3,000	Little bluestem	20
	Normal	2,100	Big bluestem	10
	Unfavorable	1,500	Beaked panicum	10
			Scribner panicum	10
4*:				
Carnasaw	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5
Clebit	Favorable	1,600	Little bluestem	20
	Normal	1,100	Big bluestem	5
	Unfavorable	800		
5*:				
Carnasaw	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5
Clebit	Favorable	1,600	Little bluestem	20
	Normal	1,100	Big bluestem	5
	Unfavorable	800		
Pickens Variant	Favorable	1,400	Little bluestem	20
	Normal	900	Big bluestem	10
	Unfavorable	600	Indiangrass	5
			Switchgrass	5
6*:				
Carnasaw	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5
Clebit	Favorable	1,600	Little bluestem	20
	Normal	1,100	Big bluestem	5
	Unfavorable	800		

See footnote at end of table.

TABLE 8.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
6*:				
Rock outcrop.				
7*:				
Carnasaw	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5
Pirum	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5
8*:				
Carnesaw	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5
Pirum	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5
Clebit	Favorable	1,600	Little bluestem	20
	Normal	1,100	Big bluestem	5
	Unfavorable	800		
9, 10	Favorable	1,600	Panicum	15
Ceda	Normal	1,100	Sedge	15
	Unfavorable	800	Beaked panicum	15
			Little bluestem	5
			Switchgrass	5
11*:				
Ceda	Favorable	1,600	Panicum	15
	Normal	1,100	Sedge	15
	Unfavorable	800	Beaked panicum	15
			Little bluestem	5
			Switchgrass	5
Rubble land.				
12*:				
Clebit	Favorable	1,600	Little bluestem	20
	Normal	1,100	Big bluestem	5
	Unfavorable	800		
Pirum	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5
13*:				
Clebit	Favorable	1,600	Little bluestem	20
	Normal	1,100	Big bluestem	5
	Unfavorable	800		
Pirum	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5
Rock outcrop.				

See footnote at end of table.

TABLE 8.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
14*:				
Clodine Variant---	Favorable	3,000	Panicum	15
	Normal	2,600	Little bluestem	10
	Unfavorable	2,300	Sedge	10
			Giant cane	10
			Big bluestem	5
			Indiangrass	5
			Switchgrass	5
Wilburton Variant-	Favorable	2,600	Little bluestem	15
	Normal	2,200	Big bluestem	10
	Unfavorable	2,000	Indiangrass	5
			Switchgrass	5
15, 16----------	Favorable	2,500	Big bluestem	20
Counts	Normal	1,800	Little bluestem	15
	Unfavorable	1,300		
17*:				
Counts----------	Favorable	2,500	Big bluestem	20
	Normal	1,800	Little bluestem	15
	Unfavorable	1,300		
Rexor----------	Favorable	5,000	Little bluestem	15
	Normal	3,500	Panicum	10
	Unfavorable	2,500	Sedge	10
			Indiangrass	5
			Big bluestem	5
18*:				
Counts----------	Favorable	2,500	Big bluestem	20
	Normal	1,800	Little bluestem	15
	Unfavorable	1,300		
Wing.				
19----------	Favorable	4,000	Panicum	15
Cupco	Normal	3,000	Little bluestem	10
	Unfavorable	2,100	Sedge	10
			Giant cane	10
			Big bluestem	5
			Indiangrass	5
			Switchgrass	5
20----------	Favorable	5,000	Little bluestem	15
Dela	Normal	3,500	Sedge	10
	Unfavorable	2,500	Panicum	10
			Giant cane	10
			Big bluestem	5
			Indiangrass	5
21*:				
Denman----------	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5
Carnasaw----------	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5
22*:				
Freestone Variant-	Favorable	3,000	Little bluestem	15
	Normal	2,400	Big bluestem	10
	Unfavorable	2,000	Indiangrass	5
			Switchgrass	5

See footnote at end of table.

TABLE 8.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
22*:				
Bernow Variant	Favorable	3,500	Little bluestem	15
	Normal	2,900	Big bluestem	10
	Unfavorable	2,500	Indiangrass	5
			Switchgrass	5
24*:				
Kenn	Favorable	3,800	Little bluestem	15
	Normal	2,700	Sedge	10
	Unfavorable	2,000	Panicum	10
			Big bluestem	5
			Indiangrass	5
			Switchgrass	5
			Uniola	5
Ceda	Favorable	1,600	Panicum	15
	Normal	1,100	Sedge	15
	Unfavorable	800	Beaked panicum	15
			Little bluestem	5
			Switchgrass	5
25	Favorable	5,000	Little bluestem	15
Neff	Normal	3,500	Panicum	10
	Unfavorable	2,500	Sedge	10
			Big bluestem	5
			Indiangrass	5
26*:				
Neff	Favorable	5,000	Little bluestem	15
	Normal	3,500	Panicum	10
	Unfavorable	2,500	Sedge	10
			Big bluestem	5
			Indiangrass	5
Rexor	Favorable	5,000	Little bluestem	15
	Normal	3,500	Panicum	10
	Unfavorable	2,500	Sedge	10
			Indiangrass	5
			Big bluestem	5
27*:				
Octavia	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5
Carnasaw	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5
Clebit	Favorable	1,600	Little bluestem	20
	Normal	1,100	Big bluestem	5
	Unfavorable	800		
28, 29	Favorable	2,400	Little bluestem	15
Pirum	Normal	1,800	Big bluestem	10
	Unfavorable	1,600	Indiangrass	5
			Switchgrass	5
30*:				
Pirum	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,600	Switchgrass	5
			Indiangrass	5
Carnasaw	Favorable	2,400	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,400	Switchgrass	5
			Indiangrass	5

See footnote at end of table.

TABLE 8.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
30*:				
Panama	Favorable	2,500	Little bluestem	15
	Normal	1,800	Big bluestem	10
	Unfavorable	1,600	Switchgrass	5
			Indiangrass	5
31	Favorable	5,000	Little bluestem	15
Rexor	Normal	3,500	Panicum	10
	Unfavorable	2,500	Sedge	10
			Indiangrass	5
			Big bluestem	5
32	Favorable	3,000	Little bluestem	15
Sallisaw	Normal	2,400	Big bluestem	10
	Unfavorable	2,000	Indiangrass	5
			Switchgrass	5
33, 34, 35	Favorable	2,600	Little bluestem	15
Shermore	Normal	1,800	Big bluestem	10
	Unfavorable	1,200	Indiangrass	5
			Switchgrass	5
38, 39	Favorable	3,500	Big bluestem	20
Stigler	Normal	2,500	Little bluestem	15
	Unfavorable	1,800		
40, 41	Favorable	2,500	Big bluestem	20
Tamaha	Normal	1,800	Little bluestem	15
	Unfavorable	1,300		
42*:				
Tuskahoma	Favorable	1,400	Little bluestem	20
	Normal	900	Big bluestem	10
	Unfavorable	600	Indiangrass	5
			Switchgrass	5
Sobol.				
43*:				
Tuskahoma	Favorable	1,400	Little bluestem	20
	Normal	900	Big bluestem	10
	Unfavorable	600	Indiangrass	5
			Switchgrass	5
Sobol.				
44, 45	Favorable	2,600	Little bluestem	15
Wilburton	Normal	1,800	Big bluestem	10
	Unfavorable	1,200	Switchgrass	5
			Indiangrass	5
47	Favorable	2,500	Big bluestem	20
Woodson Variant	Normal	1,800	Little bluestem	15
	Unfavorable	1,300		
48, 49, 50	Favorable	3,000	Little bluestem	20
Yanush	Normal	2,100	Big bluestem	10
	Unfavorable	1,500	Beaked panicum	10
			Scribner panicum	10
51*:				
Yanush	Favorable	3,000	Little bluestem	20
	Normal	2,100	Big bluestem	10
	Unfavorable	1,500	Beaked panicum	10
			Scribner panicum	10
Sobol.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1*:					
Bengal	Moderate: percs slowly, large stones.	Moderate: percs slowly, large stones.	Severe: large stones, slope.	Moderate: large stones.	Severe: large stones.
Clebit	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones, depth to rock, large stones.	Moderate: large stones.	Severe: small stones, thin layer, large stones.
2*:					
Bengal	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Moderate: large stones, slope.	Severe: large stones, slope.
Denman	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: large stones, slope.	Severe: large stones, slope.
3*:					
Bigfork	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, small stones, large stones.	Severe: large stones, slope.	Severe: large stones, slope.
Yanush	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope.
4*:					
Carnasaw	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.
Clebit	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, large stones.	Moderate: large stones, slope.	Severe: slope, thin layer, large stones.
5*:					
Carnasaw	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.	Severe: large stones, slope.
Clebit	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope, thin layer, large stones.
Pickens Variant	Severe: slope, large stones, depth to rock.	Severe: slope, large stones, depth to rock.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, thin layer, slope.
6*:					
Carnasaw	Moderate: large stones, percs slowly.	Moderate: large stones, percs slowly.	Severe: large stones, slope.	Moderate: large stones.	Severe: large stones.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
6*:					
Clebit	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones, large stones, slope.	Moderate: large stones.	Severe: small stones, thin layer, large stones.
Rock outcrop.					
7*:					
Carnasaw	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
Pirum	Slight	Slight	Severe: slope.	Slight	Moderate: thin layer.
8*:					
Carnasaw	Moderate: large stones, percs slowly, slope.	Moderate: large stones, percs slowly, slope.	Severe: slope, large stones.	Moderate: large stones.	Severe: large stones.
Pirum	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: large stones.	Severe: large stones.
Clebit	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones, large stones.	Moderate: large stones.	Severe: small stones, thin layer, large stones.
9--- Ceda	Severe: flooding, small stones.	Severe: small stones.	Severe: small stones.	Slight	Severe: small stones, droughty.
10--- Ceda	Severe: flooding, small stones.	Severe: small stones.	Severe: flooding, small stones.	Moderate: flooding.	Severe: small stones, flooding, droughty.
11*:					
Ceda	Severe: flooding, small stones.	Severe: small stones.	Severe: flooding, small stones.	Moderate: flooding.	Severe: small stones, flooding, droughty.
Rubble land.					
12*:					
Clebit	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Slight	Severe: small stones, thin layer.
Pirum	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
13*:					
Clebit	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope, thin layer, large stones.
Pirum	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.	Severe: large stones, slope.
Rock outcrop.					

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
14*:					
Clodine Variant	Severe: wetness.	Severe: wetness.	Severe: wetness, small stones.	Severe: wetness.	Severe: small stones, wetness.
Wilburton Variant	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
15, 16--Counts	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
17*:					
Counts	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly, slope.	Severe: erodes easily.	Moderate: wetness, slope.
Rexor	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
18*:					
Counts	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
Wing	Severe: wetness, excess sodium.	Severe: wetness, excess sodium, percs slowly.	Severe: wetness, excess sodium, percs slowly.	Severe: wetness, erodes easily.	Severe: excess sodium, wetness, droughty.
19--Cupco	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
20--Dela	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
21*:					
Denman	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: large stones, slope.	Severe: large stones, slope.
Carnasaw	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.
22*:					
Freestone Variant	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Bernow Variant	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Slight.
23--Kanima	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
24*:					
Kenn	Severe: flooding.	Slight	Moderate: small stones, flooding.	Slight	Moderate: flooding, droughty.
Ceda	Severe: flooding, small stones.	Severe: small stones.	Severe: small stones.	Slight	Severe: small stones, droughty.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
25--- Neff	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
26*: Neff---	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Rexor---	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
27*: Octavia---	Severe: slope.	Severe: slope.	Severe: large stones, small stones, slope.	Severe: slope.	Severe: large stones, slope.
Carnasaw---	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.	Severe: large stones, slope.
Clebit---	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope, thin layer, large stones.
28, 29--- Pirum	Slight---	Slight---	Moderate: slope, small stones, depth to rock.	Slight---	Moderate: thin layer.
30*: Pirum---	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: large stones, slope.	Severe: large stones, slope.
Carnasaw---	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.
Panama---	Severe: slope, small stones, large stones.	Severe: large stones, slope, small stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: small stones, large stones, slope.
31--- Rexor	Severe: flooding.	Slight---	Moderate: flooding.	Slight---	Moderate: flooding.
32--- Sallisaw	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Severe: erodes easily.	Moderate: small stones.
33, 34, 35--- Shermore	Moderate: percs slowly, wetness.	Moderate: percs slowly, wetness.	Moderate: wetness, percs slowly, slope.	Moderate: wetness.	Moderate: wetness, droughty.
36--- Sobol	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
37*: Sobol---	Severe: wetness, slope.	Severe: wetness, slope.	Severe: slope, wetness, large stones.	Severe: wetness, erodes easily.	Severe: wetness, slope.
Rock outcrop.					

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
38, 39---------- Stigler	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Slight.
40---------- Tamaha	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
41---------- Tamaha	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
42*: Tuskahoma----------	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, depth to rock, slope.	Severe: wetness, erodes easily.	Severe: wetness, thin layer.
Sobol----------	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness, erodes easily.	Severe: wetness.
43*: Tuskahoma----------	Severe: wetness, percs slowly, slope.	Severe: wetness, percs slowly, slope.	Severe: slope, wetness, depth to rock.	Severe: wetness, erodes easily.	Severe: wetness, thin layer, slope.
Sobol----------	Severe: wetness, slope.	Severe: wetness, slope.	Severe: slope, wetness, large stones.	Severe: wetness, erodes easily.	Severe: wetness, slope.
44---------- Wilburton	Moderate: small stones.	Moderate: small stones.	Severe: small stones, slope.	Moderate: large stones.	Moderate: small stones, large stones.
45---------- Wilburton	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: large stones, slope.	Severe: slope.
46---------- Wister	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness.
47---------- Woodson Variant	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, erodes easily.	Severe: wetness.
48, 49---------- Yanush	Moderate: small stones, large stones.	Moderate: small stones, large stones.	Severe: small stones, large stones.	Moderate: large stones.	Moderate: small stones, large stones.
50---------- Yanush	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Moderate: large stones, slope.	Severe: slope.
51*: Yanush----------	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Moderate: large stones, slope.	Severe: slope.
Sobol----------	Severe: wetness, slope.	Severe: wetness, slope.	Severe: slope, wetness.	Severe: wetness, erodes easily.	Severe: wetness, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor"]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1*:										
Bengal	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Clebit	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
2*:										
Bengal	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Denman	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
3*:										
Bigfork	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Yanush	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
4*:										
Carnasaw	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Clebit	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
5*:										
Carnasaw	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Clebit	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Pickens Variant	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
6*:										
Carnasaw	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Clebit	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Rock outcrop.										
7*:										
Carnasaw	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Pirum	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
8*:										
Carnasaw	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Pirum	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
8*:										
Clebit	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
9, 10---------- Ceda	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
11*:										
Ceda----------	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Rubble land.										
12*:										
Clebit----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Pirum----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
13*:										
Clebit----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Pirum----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop.										
14*:										
Clodine Variant---	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Wilburton Variant-	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
15---------- Counts	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
16---------- Counts	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
17*:										
Counts----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Rexor----------	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
18*:										
Counts----------	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
Wing----------	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor.
19---------- Cupco	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
20---------- Dela	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
21*:										
Denman----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Carnasaw----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
22*:										
Freestone Variant-	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Bernow Variant----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
23---------- Kanima	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
24*:										
Kenn----------	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Ceda----------	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
25---------- Neff	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
26*:										
Neff----------	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
Rexor----------	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
27*:										
Octavia----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Carnasaw----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Clebit----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
28, 29---------- Pirum	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
30*:										
Pirum----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Carnasaw----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Panama----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
31---------- Rexor	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
32---------- Sallisaw	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
33---------- Shermore	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
34, 35---------- Shermore	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
36---------- Sobol	Fair	Good	Good	Fair	Good	Poor	Very poor.	Good	Fair	Very poor.
37*:										
Sobol----------	Poor	Fair	Good	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
Rock outcrop.										

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
38, 39--Stigler	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
40--Tamaha	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
41--Tamaha	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
42*:										
Tuskahoma	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.
Sobol	Fair	Good	Good	Fair	Good	Poor	Very poor.	Good	Fair	Very poor.
43*:										
Tuskahoma	Poor	Fair	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.
Sobol	Poor	Fair	Good	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
44--Wilburton	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Poor.
45--Wilburton	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
46--Wister	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
47--Woodson Variant	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
48, 49--Yanush	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Good	Very poor.
50--Yanush	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
51*:										
Yanush	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Sobol	Poor	Fair	Good	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1*:						
Bengal	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: large stones.
Clebit	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: small stones, thin layer, large stones.
2*:						
Bengal	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: low strength, shrink-swell, slope.	Severe: large stones, slope.
Denman	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: large stones, slope.
3*:						
Bigfork	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
Yanush	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
4*:						
Carnasaw	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: large stones, slope.
Clebit	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer, large stones.
5*:						
Carnasaw	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: large stones, slope.
Clebit	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer, large stones.
Pickens Variant	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: large stones, thin layer, slope.
6*:						
Carnasaw	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: large stones.
Clebit	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: small stones, thin layer, large stones.
Rock outcrop.						

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
7*:						
Carnasaw	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Slight.
Pirum	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Moderate: thin layer.
8*:						
Carnasaw	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell.	Severe: large stones.
Pirum	Severe: depth to rock.	Moderate: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Severe: large stones.
Clebit	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: small stones, thin layer, large stones.
9 Ceda	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: small stones, droughty.
10 Ceda	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: small stones, flooding, droughty.
11*:						
Ceda	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: small stones, flooding, droughty.
Rubble land.						
12*:						
Clebit	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: small stones, thin layer.
Pirum	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: slope, thin layer.
13*:						
Clebit	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer, large stones.
Pirum	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
Rock outcrop.						
14*:						
Clodine Variant	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: small stones, wetness.
Wilburton Variant	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: small stones.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
15, 16--- Counts	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Moderate: wetness.
17*: Counts---	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell.	Moderate: wetness, slope.
Rexor---	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
18*: Counts---	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Moderate: wetness.
Wing---	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: excess sodium, wetness, droughty.
19--- Cupco	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness.
20--- Dela	Moderate: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
21*: Denman---	Severe: slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: large stones, slope.
Carnasaw---	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: large stones, slope.
22*: Freestone Variant	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Bernow Variant---	Moderate: wetness.	Slight---	Moderate: wetness.	Slight---	Slight---	Slight.
23--- Kanima	Severe: slope.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: slope, unstable fill.	Severe: small stones, slope.
24*: Kenn---	Moderate: flooding, large stones.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, droughty.
Ceda---	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: small stones, droughty.
25--- Neff	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness.
26*: Neff---	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
26*:						
Rexor	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
27*:						
Octavia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
Carnasaw	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: large stones, slope.
Clebit	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer, large stones.
28 Pirum	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: thin layer.
29 Pirum	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Moderate: thin layer.
30*:						
Pirum	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
Carnasaw	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: large stones, slope.
Panama	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: small stones, large stones, slope.
31 Rexor	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
32 Sallisaw	Slight	Slight	Slight	Slight	Slight	Moderate: small stones.
33 Shermore	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
34 Shermore	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness.	Moderate: wetness, droughty.
35 Shermore	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness.	Moderate: wetness, droughty.
36 Sobol	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: shrink-swell, wetness.	Severe: wetness, shrink-swell.	Severe: shrink-swell, wetness.	Severe: wetness.
37*:						
Sobol	Severe: wetness, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, wetness, slope.	Severe: wetness, slope.
Rock outcrop.						

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
38, 39---------- Stigler	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Slight.
40---------- Tamaha	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Moderate: wetness.
41---------- Tamaha	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Moderate: wetness.
42*: Tuskahoma--------	Severe: depth to rock, wetness.	Severe: wetness, shrink-swell.	Severe: wetness, depth to rock, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, thin layer.
Sobol----------	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: shrink-swell, wetness.	Severe: wetness, shrink-swell.	Severe: shrink-swell, wetness.	Severe: wetness.
43*: Tuskahoma--------	Severe: depth to rock, wetness, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, depth to rock, slope.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, wetness, slope.	Severe: wetness, thin layer, slope.
Sobol----------	Severe: wetness, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, wetness, slope.	Severe: wetness, slope.
44---------- Wilburton	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: slope, large stones.	Moderate: large stones.	Moderate: small stones, large stones.
45---------- Wilburton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
46---------- Wister	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Moderate: wetness.
47---------- Woodson Variant	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness.
48---------- Yanush	Moderate: large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, large stones.	Moderate: small stones, large stones.
49---------- Yanush	Moderate: large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, large stones.	Moderate: large stones, shrink-swell, slope.	Moderate: shrink-swell, large stones.	Moderate: small stones, large stones.
50---------- Yanush	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
51*: Yanush----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Sobol----------	Severe: wetness, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, shrink-swell, slope.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, wetness, slope.	Severe: wetness, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1*:					
Bengal	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Clebit	Severe: depth to rock.	Severe: depth to rock, seepage, large stones.	Severe: depth to rock, seepage, large stones.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones, thin layer.
2*:					
Bengal	Severe: depth to rock, percs slowly, slope.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey, slope.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Denman	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, too clayey, slope.	Severe: slope.	Poor: too clayey, hard to pack, slope.
3*:					
Bigfork	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.
Yanush	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
4*:					
Carnasaw	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Clebit	Severe: depth to rock, slope.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
5*:					
Carnasaw	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Clebit	Severe: depth to rock, slope.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Pickens Variant	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
6*:					
Carnasaw	Severe: percs slowly.	Moderate: depth to rock, slope, large stones.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
Clebit	Severe: depth to rock.	Severe: depth to rock, seepage, large stones.	Severe: depth to rock, seepage, large stones.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones, thin layer.
Rock outcrop.					
7*:					
Carnasaw	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
Pirum	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
8*:					
Carnasaw	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Pirum	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Clebit	Severe: depth to rock.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, seepage, large stones.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones, thin layer.
9, 10--Ceda	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: small stones, seepage.
11*:					
Ceda	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: small stones, seepage.
Rubble land.					
12*:					
Clebit	Severe: depth to rock.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones, thin layer.
Pirum	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
13*:					
Clebit	Severe: depth to rock, slope.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Pirum	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
14*:					
Clodine Variant	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness, small stones.
Wilburton Variant	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
15--- Counts	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
16--- Counts	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
17*:					
Counts	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Rexor	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.
18*:					
Counts	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Wing	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey, excess sodium.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
19--- Cupco	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
20--- Dela	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
21*:					
Denman	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Carnasaw	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
22*:					
Freestone Variant	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
22*: Bernow Variant	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Slight	Fair: too clayey, wetness.
23 Kanima	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
24*: Kenn	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: small stones.
Ceda	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: small stones, seepage.
25 Neff	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
26*: Neff	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Rexor	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.
27*: Octavia	Severe: wetness, slope, percs slowly.	Severe: slope, large stones.	Severe: slope, too clayey.	Severe: slope.	Poor: slope, too clayey.
Carnasaw	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Clebit	Severe: depth to rock, slope.	Severe: depth to rock, slope, seepage.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
28, 29 Pirum	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
30*: Pirum	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Carnasaw	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Panama	Severe: wetness, percs slowly, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Poor: small stones, slope, large stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
31 Rexor	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey, wetness.
32 Sallisaw	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: small stones.
33, 34, 35 Shermore	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
36 Sobol	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, too clayey, hard to pack.
37*: Sobol	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness, slope.	Severe: depth to rock, wetness, slope.	Poor: area reclaim, too clayey, hard to pack.
Rock outcrop.					
38 Stigler	Severe: wetness, percs slowly.	Slight	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
39 Stigler	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
40, 41 Tamaha	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
42*: Tuskahoma	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, too clayey, hard to pack.
Sobol	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, too clayey, hard to pack.
43*: Tuskahoma	Severe: depth to rock, wetness, slope.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness, slope.	Severe: depth to rock, wetness, slope.	Poor: area reclaim, too clayey, hard to pack.
Sobol	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness, slope.	Severe: depth to rock, wetness, slope.	Poor: area reclaim, too clayey, hard to pack.
44 Wilburton	Moderate: percs slowly, large stones.	Moderate: seepage, slope, large stones.	Severe: large stones.	Slight	Poor: small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
45---------- Wilburton	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.	Poor: small stones, slope.
46---------- Wister	Severe: wetness, percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
47---------- Woodson Variant	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
48, 49---------- Yanush	Moderate: percs slowly, large stones.	Moderate: seepage, slope, large stones.	Moderate: too clayey, large stones.	Slight----------	Poor: small stones.
50---------- Yanush	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
51*: Yanush----------	Severe: slope.	Severe: slope.	Severe: slope,	Severe: slope.	Poor: small stones, slope.
Sobol----------	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, wetness, slope.	Severe: depth to rock, wetness, slope.	Poor: area reclaim, too clayey, hard to pack.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable"]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1*:				
Bengal	Poor: low strength, shrink-swell, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, thin layer, small stones.
Clebit	Poor: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, large stones.
2*:				
Bengal	Poor: low strength, shrink-swell, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, thin layer, small stones.
Denman	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, small stones, large stones.
3*:				
Bigfork	Poor: area reclaim, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope, thin layer.
Yanush	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, thin layer, slope.
4*:				
Carnasaw	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Clebit	Poor: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
5*:				
Carnasaw	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Clebit	Poor: area reclaim, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Pickens Variant	Poor: area reclaim, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer, large stones.
6*:				
Carnasaw	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
6*:				
Clebit	Poor: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, large stones.
Rock outcrop.				
7*:				
Carnasaw	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Pirum	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
8*:				
Carnasaw	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Pirum	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, thin layer.
Clebit	Poor: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, large stones.
9, 10 Ceda	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
11*:				
Ceda	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
Rubble land.				
12*:				
Clebit	Poor: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, thin layer.
Pirum	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
13*:				
Clebit	Poor: area reclaim, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Pirum	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
Rock outcrop.				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
14*:				
Clodine Variant	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, thin layer.
Wilburton Variant	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
15, 16 Counts	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
17*:				
Counts	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Rexor	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
18*:				
Counts	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Wing	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess sodium, thin layer.
19 Cupco	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, thin layer.
20 Dela	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
21*:				
Denman	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, thin layer, large stones.
Carnasaw	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
22*:				
Freestone Variant	Fair: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Bernow Variant	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
23 Kanima	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
24*:				
Kenn	Fair: low strength, shrink-swell, large stones.	Improbable: small stones.	Probable	Poor: small stones, large stones, area reclaim.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
24*: Ceda	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
25 Neff	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, thin layer.
26*: Neff	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, thin layer.
Rexor	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
27*: Octavia	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, small stones, slope.
Carnasaw	Poor: shrink-swell, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Clebit	Poor: area reclaim, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
28, 29 Pirum	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
30*: Pirum	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
Carnasaw	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Panama	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: slope, small stones, large stones.
31 Rexor	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
32 Sallisaw	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
33, 34, 35 Shermore	Fair: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
36 Sobol	Poor: area reclaim, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
37*:				
Sobol	Poor: area reclaim, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness, slope.
Rock outcrop.				
38, 39---- Stigler	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
40, 41---- Tamaha	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
42*:				
Tuskahoma	Poor: area reclaim, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, wetness.
Sobol	Poor: area reclaim, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
43*:				
Tuskahoma	Poor: area reclaim, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, thin layer, wetness.
Sobol	Poor: area reclaim, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
44, 45---- Wilburton	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, thin layer.
46---- Wister	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
47---- Woodson Variant	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
48, 49---- Yanush	Fair: shrink-swell, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, thin layer, large stones.
50----	Fair: shrink-swell, large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope, thin layer.
51*:				
Yanush	Fair: shrink-swell, large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, thin layer, slope.
Sobol	Poor: area reclaim, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1*:							
Bengal	Moderate: depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Droughty, percs slowly, depth to rock.	Large stones, depth to rock.	Large stones, depth to rock, droughty.
Clebit	Severe: depth to rock, seepage.	Severe: large stones, thin layer.	Severe: no water.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Large stones, droughty, depth to rock.
2*:							
Bengal	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Droughty, percs slowly, depth to rock.	Large stones, slope, depth to rock.	Large stones, slope, droughty.
Denman	Severe: slope.	Moderate: hard to pack, large stones, thin layer.	Severe: no water.	Deep to water	Large stones, percs slowly, slope.	Slope, large stones, percs slowly.	Large stones, slope, percs slowly.
3*:							
Bigfork	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Yanush	Severe: slope.	Moderate: large stones.	Severe: no water.	Deep to water	Droughty, slope, large stones.	Slope, large stones.	Large stones, slope, droughty.
4*:							
Carnasaw	Severe: slope.	Moderate: thin layer, hard to pack, large stones.	Severe: no water.	Deep to water	Percs slowly, slope.	Slope, percs slowly, large stones.	Slope, large stones, percs slowly.
Clebit	Severe: depth to rock, slope, seepage.	Severe: large stones, thin layer.	Severe: no water.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
5*:							
Carnasaw	Severe: slope.	Moderate: thin layer, hard to pack, large stones.	Severe: no water.	Deep to water	Percs slowly, slope.	Slope, percs slowly, large stones.	Slope, large stones, percs slowly.
Clebit	Severe: depth to rock, slope, seepage.	Severe: large stones, thin layer.	Severe: no water.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
5*:							
Pickens Variant--	Severe: depth to rock, slope.	Severe: thin layer, large stones.	Severe: no water.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
6*:							
Carnasaw----------	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack, large stones.	Severe: no water.	Deep to water	Percs slowly, slope.	Percs slowly, large stones.	Large stones, percs slowly.
Clebit----------	Severe: depth to rock, seepage.	Severe: large stones, thin layer.	Severe: no water.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock.	Large stones, droughty, depth to rock.
Rock outcrop.							
7*:							
Carnasaw----------	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Severe: no water.	Deep to water	Percs slowly, erodes easily, slope.	Percs slowly, erodes easily.	Erodes easily, percs slowly.
Pirum----------	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
8*:							
Carnasaw----------	Severe: slope.	Moderate: thin layer, hard to pack, large stones.	Severe: no water.	Deep to water	Percs slowly, slope.	Percs slowly, large stones, slope.	Large stones, percs slowly, slope.
Pirum----------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock, slope.	Large stones, depth to rock, slope.	Large stones, depth to rock, slope.
Clebit----------	Severe: depth to rock, seepage, slope.	Severe: large stones, thin layer.	Severe: no water.	Deep to water	Large stones, droughty, depth to rock.	Large stones, depth to rock, slope.	Large stones, slope, depth to rock.
9, 10---------- Ceda	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Flooding, droughty.	Large stones---	Droughty, large stones.
11*:							
Ceda----------	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Flooding, droughty.	Large stones---	Droughty, large stones.
Rubble land.							
12*:							
Clebit----------	Severe: depth to rock, slope, seepage.	Severe: thin layer.	Severe: no water.	Deep to water	Droughty, depth to rock, slope.	Slope, depth to rock.	Depth to rock, slope, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
12*:							
Pirum	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
13*:							
Clebit	Severe: depth to rock, slope, seepage.	Severe: large stones, thin layer.	Severe: no water.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Pirum	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock, slope, large stones.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Rock outcrop.							
14*:							
Clodine Variant	Moderate: seepage.	Severe: wetness.	Severe: no water.	Favorable	Wetness	Wetness	Wetness.
Wilburton Variant	Moderate: seepage.	Moderate: piping.	Severe: no water.	Deep to water	Favorable	Favorable	Favorable.
15, 16--Counts	Slight	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
17*:							
Counts	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness, slope.	Wetness, erodes easily, slope.
Rexor	Moderate: seepage.	Slight	Severe: no water.	Deep to water	Flooding	Favorable	Favorable.
18*:							
Counts	Slight	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Wing	Slight	Severe: wetness, excess sodium.	Severe: no water.	Percs slowly, excess sodium.	Excess sodium, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Percs slowly, excess sodium, erodes easily.
19--Cupco	Slight	Severe: wetness.	Severe: no water.	Flooding	Wetness, flooding.	Wetness	Wetness.
20--Dela	Severe: seepage.	Severe: piping.	Moderate: deep to water.	Deep to water	Flooding	Favorable	Favorable.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
21*:							
Denman	Severe: slope.	Moderate: hard to pack, large stones, thin layer.	Severe: no water.	Deep to water	Large stones, percs slowly, slope.	Slope, large stones, percs slowly.	Large stones, slope, percs slowly.
Carnasaw	Severe: slope.	Moderate: thin layer, hard to pack, large stones.	Severe: no water.	Deep to water	Percs slowly, slope.	Slope, percs slowly, large stones.	Slope, large stones, percs slowly.
22*:							
Freestone Variant	Slight	Moderate: piping, wetness.	Severe: no water.	Favorable	Wetness	Wetness	Favorable.
Bernow Variant	Slight	Moderate: piping.	Severe: no water.	Deep to water	Favorable	Favorable	Favorable.
23--Kanima	Severe: slope.	Moderate: seepage.	Severe: no water.	Deep to water	Droughty, slope.	Slope	Slope, droughty.
24*:							
Kenn	Moderate: seepage.	Moderate: piping, large stones.	Severe: no water.	Deep to water	Flooding, droughty.	Large stones	Large stones, droughty.
Ceda	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Flooding, droughty.	Large stones	Droughty, large stones.
25--Neff	Slight	Severe: wetness.	Severe: no water.	Flooding	Flooding, wetness.	Wetness	Wetness.
26*:							
Neff	Slight	Severe: wetness.	Severe: no water.	Flooding	Flooding, wetness.	Wetness	Wetness.
Rexor	Moderate: seepage.	Slight	Severe: no water.	Deep to water	Flooding	Favorable	Favorable.
27*:							
Octavia	Severe: slope.	Moderate: piping, large stones.	Severe: no water.	Deep to water	Large stones, slope.	Slope, large stones.	Large stones, slope.
Carnasaw	Severe: slope.	Moderate: thin layer, hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope.	Slope, percs slowly, large stones.	Slope, large stones, percs slowly.
Clebit	Severe: depth to rock, slope, seepage.	Severe: large stones, thin layer.	Severe: no water.	Deep to water	Large stones, droughty, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
28---------- Pirum	Moderate: seepage, depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock	Depth to rock	Depth to rock.
29---------- Pirum	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
30*:							
Pirum----------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Carnasaw----------	Severe: slope.	Moderate: thin layer, hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope.	Slope, percs slowly, large stones.	Slope, large stones, percs slowly.
Panama----------	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Slope, large stones.	Large stones, slope, droughty.
31---------- Rexor	Moderate: seepage.	Slight---------	Severe: no water.	Deep to water	Flooding-------	Favorable------	Favorable.
32---------- Sallisaw	Moderate: seepage.	Slight---------	Severe: no water.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
33---------- Shermore	Slight---------	Moderate: wetness.	Severe: no water.	Favorable------	Wetness, droughty, rooting depth.	Wetness, rooting depth.	Droughty, rooting depth.
34, 35---------- Shermore	Moderate: slope.	Moderate: wetness.	Severe: no water.	Slope----------	Wetness, droughty, rooting depth.	Wetness, rooting depth.	Droughty, rooting depth.
36---------- Sobol	Moderate: depth to rock, slope.	Severe: thin layer, wetness.	Severe: no water.	Percs slowly, depth to rock, slope.	Wetness, percs slowly, depth to rock.	Depth to rock, erodes easily.	Wetness, erodes easily.
37*:							
Sobol----------	Severe: slope.	Severe: thin layer, wetness.	Severe: no water.	Percs slowly, depth to rock, slope.	Wetness, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Wetness, slope, erodes easily.
Rock outcrop.							
38, 39---------- Stigler	Slight---------	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly---	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
40---------- Tamaha	Slight---------	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly---	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
41---------- Tamaha	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
42*:							
Tuskahoma----------	Severe: depth to rock.	Severe: thin layer, wetness.	Severe: no water.	Percs slowly, depth to rock, slope.	Wetness, droughty, percs slowly.	Depth to rock, erodes easily.	Wetness, erodes easily.
Sobol----------	Moderate: depth to rock, slope.	Severe: thin layer, wetness.	Severe: no water.	Percs slowly, depth to rock, slope.	Wetness, percs slowly, depth to rock.	Depth to rock, erodes easily.	Wetness, erodes easily.
43*:							
Tuskahoma----------	Severe: depth to rock, slope.	Severe: thin layer, wetness.	Severe: no water.	Percs slowly, depth to rock, slope.	Wetness, droughty, percs slowly.	Slope, depth to rock, erodes easily.	Wetness, slope, erodes easily.
Sobol----------	Severe: slope.	Severe: thin layer, wetness.	Severe: no water.	Percs slowly, depth to rock, slope.	Wetness, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Wetness, slope, erodes easily.
44---------- Wilburton	Moderate: seepage, slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, droughty, slope.	Large stones---	Large stones, droughty.
45---------- Wilburton	Severe: slope.	Severe: large stones.	Severe: no water.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
46---------- Wister	Moderate: depth to rock.	Moderate: thin layer, hard to pack, wetness.	Severe: no water.	Percs slowly---	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
47---------- Woodson Variant	Slight---------	Severe: wetness.	Severe: no water.	Percs slowly---	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
48---------- Yanush	Moderate: seepage.	Moderate: large stones.	Severe: no water.	Deep to water	Droughty, large stones.	Large stones---	Large stones, droughty.
49---------- Yanush	Moderate: seepage.	Moderate: large stones, slope.	Severe: no water.	Deep to water	Droughty, slope, large stones.	Large stones---	Large stones, droughty.
50---------- Yanush	Severe: slope.	Moderate: large stones.	Severe: no water.	Deep to water	Droughty, slope, large stones.	Slope, large stones.	Large stones, slope, droughty.
51*:							
Yanush----------	Severe: slope.	Moderate: large stones.	Severe: no water.	Deep to water	Droughty, slope, large stones.	Slope, large stones.	Large stones, slope, droughty.
Sobol----------	Severe: slope.	Severe: thin layer, wetness.	Severe: no water.	Percs slowly, slope, depth to rock.	Percs slowly, depth to rock, wetness.	Slope, depth to rock, erodes easily.	Slope, wetness, erodes easily.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1*:											
Bengal	0-8	Stony loam	ML, CL, SM, SC	A-2, A-4	10-55	85-90	85-90	70-85	30-75	<30	NP-10
	8-24	Clay, silty clay	CL, CH	A-7	0	85-100	85-100	75-100	70-90	41-60	18-34
	24-32	Clay, silty clay, shaly clay.	CL, CH	A-7	0	55-100	55-100	55-100	50-99	41-60	18-34
	32-37	Weathered bedrock	---	---	---	---	---	---	---	---	---
Clebit	0-5	Stony fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	15-40	35-50	35-50	30-50	13-30	<26	NP-7
	5-16	Stony loam, stony fine sandy loam, bouldery fine sandy loam.	GM, GC, GM-GC	A-1, A-2, A-4	15-40	35-50	35-50	30-50	13-45	<35	NP-13
	16-21	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
2*:											
Bengal	0-7	Stony loam	ML, CL, SM, SC	A-2, A-4	10-55	85-90	85-90	70-85	30-75	<30	NP-10
	7-10	Stony clay loam, stony sandy clay loam, sandy clay loam.	CL, SC	A-2, A-4, A-6	10-30	85-90	85-90	70-90	30-80	25-40	7-20
	10-22	Clay, silty clay	CL, CH	A-7	0	85-100	85-100	75-100	70-90	41-60	18-34
	22-29	Clay, silty clay, shaly clay.	CL, CH	A-7	0	55-100	55-100	55-100	50-99	41-60	18-34
	29-36	Weathered bedrock	---	---	---	---	---	---	---	---	---
Denman	0-5	Stony loam	ML, CL, CL-ML	A-4	25-55	75-90	75-90	65-90	50-75	22-30	2-10
	5-10	Stony loam, cobbly loam, stony clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0-30	60-90	60-90	50-90	40-80	25-40	4-18
	10-28	Clay loam, loam, gravelly clay loam.	CL, SC	A-4, A-6	0-25	55-90	55-90	50-90	36-80	30-40	9-18
	28-46	Clay, silty clay, shaly silty clay.	CL, CH	A-7	0	55-90	55-90	55-90	50-90	41-60	18-34
	46-57	Weathered bedrock	---	---	---	---	---	---	---	---	---
3*:											
Bigfork	0-13	Stony silt loam	CL, GC, SC, CL-ML	A-4, A-6	40-75	55-80	55-80	45-80	36-80	22-32	5-15
	13-28	Stony silty clay loam, stony clay loam, cherty clay loam.	CL, GC, SC	A-6, A-7	40-75	55-80	55-80	50-80	44-80	33-43	12-20
	28-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Yanush	0-12	Stony loam	ML, CL, GC, GM	A-2, A-4, A-6	20-30	45-75	45-75	40-75	35-70	22-35	2-14
	12-64	Very cherty clay loam, very cherty silty clay loam.	GC, CL	A-6, A-7, A-2	20-30	20-60	20-60	20-60	15-55	33-43	12-20

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
4*:											
Carnasaw--------	0-13	Stony fine sandy loam.	ML, CL, SM, SC	A-4, A-2	25-40	85-95	85-95	75-95	30-95	<30	NP-10
	13-29	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0-10	85-95	85-95	75-95	70-95	37-65	18-35
	29-37	Clay, silty clay	CL, CH	A-7	0-10	85-95	85-95	80-95	70-95	41-65	18-35
	37-46	Gravelly silty clay, gravelly clay, clay.	CL, CH	A-7	0-10	55-90	55-90	55-90	50-90	41-65	18-35
	46-55	Weathered bedrock	---	---	---	---	---	---	---	---	---
Clebit----------	0-6	Stony fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	15-40	35-50	35-50	30-50	13-30	<26	NP-7
	6-12	Stony loam, stony fine sandy loam, bouldery fine sandy loam.	GM, GC, GM-GC	A-1, A-2, A-4	15-40	35-50	35-50	30-50	13-45	<35	NP-13
	12-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
5*:											
Carnasaw--------	0-9	Bouldery loam----	ML, CL, SM, SC	A-2, A-4	25-40	85-95	85-95	75-95	30-95	<30	NP-10
	9-14	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0-10	85-95	85-95	75-95	70-95	37-65	18-35
	14-24	Clay, silty clay	CL, CH	A-7	0-10	85-95	85-95	80-95	70-95	41-65	18-35
	24-42	Gravelly silty clay, gravelly clay, clay.	CL, CH	A-7	0-10	55-90	55-90	55-90	50-90	41-65	18-35
	42-55	Weathered bedrock	---	---	---	---	---	---	---	---	---
Clebit----------	0-6	Bouldery fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	15-40	35-50	35-50	30-50	13-30	<26	NP-7
	6-10	Stony loam, stony fine sandy loam, bouldery fine sandy loam.	GM, GC, GM-GC	A-1, A-2, A-4	15-40	35-50	35-50	30-50	13-45	<35	NP-13
	10-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Pickens Variant-	0-6	Bouldery loam----	CL, CL-ML, SC, SM-SC	A-2, A-4, A-6	25-45	45-70	45-70	40-70	30-60	25-35	5-13
	6-19	Very shaly loam	GC, GM-GC	A-1, A-2, A-4, A-6	0	20-50	20-50	20-50	13-45	25-35	5-13
	19-24	Weathered bedrock	---	---	---	---	---	---	---	---	---
6*:											
Carnasaw--------	0-9	Stony loam-------	ML, CL, SM, SC	A-4, A-2	25-40	85-95	85-95	75-95	30-95	<30	NP-10
	9-18	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0-10	85-95	85-95	75-95	70-95	37-65	18-35
	18-38	Clay, silty clay	CL, CH	A-7	0-10	85-95	85-95	80-95	70-95	41-65	18-35
	38-45	Gravelly silty clay, gravelly clay, clay.	CL, CH	A-7	0-10	55-90	55-90	55-90	50-90	41-65	18-35
	45-55	Weathered bedrock	---	---	---	---	---	---	---	---	---
Clebit----------	0-4	Stony fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	15-40	35-50	35-50	30-50	13-30	<26	NP-7
	4-15	Stony loam, stony fine sandy loam, bouldery fine sandy loam.	GM, GC, GM-GC	A-1, A-2, A-4	15-40	35-50	35-50	30-50	13-45	<35	NP-13
	15-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
7*:											
Carnasaw--------	0-5	Loam----------	ML, CL, SM, SC	A-4, A-2	0-25	75-95	75-95	65-95	25-95	<30	NP-10
	5-12	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0-10	85-95	85-95	75-95	70-95	37-65	18-35
	12-32	Clay, silty clay	CL, CH	A-7	0-10	85-95	85-95	80-95	70-95	41-65	18-35
	32-45	Gravelly silty clay, gravelly clay, clay.	CL, CH	A-7	0-10	55-90	55-90	55-90	50-90	41-65	18-35
	45-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Pirum----------	0-13	Fine sandy loam	SM, ML	A-4	0	75-100	75-100	70-90	36-65	<20	NP-3
	13-32	Sandy clay loam, clay loam, loam.	CL, CL-ML	A-4, A-6	0	75-100	75-100	70-90	50-70	22-35	5-15
	32-40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
8*:											
Carnasaw--------	0-8	Stony loam-------	ML, CL, SM, SC	A-4, A-2	25-40	85-95	85-95	75-95	30-95	<30	NP-10
	8-24	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0-10	85-95	85-95	75-95	70-95	37-65	18-35
	24-36	Clay, silty clay	CL, CH	A-7	0-10	85-95	85-95	80-95	70-95	41-65	18-35
	36-50	Gravelly silty clay, gravelly clay, clay.	CL, CH	A-7	0-10	55-90	55-90	55-90	50-90	41-65	18-35
	50-54	Weathered bedrock	---	---	---	---	---	---	---	---	---
Pirum----------	0-14	Stony fine sandy loam.	SM, ML	A-4	10-35	75-100	75-100	70-90	36-65	<20	NP-3
	14-34	Sandy clay loam, clay loam, loam.	CL, CL-ML	A-4, A-6	0-10	75-100	75-100	70-90	50-70	22-35	5-15
	34-38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Clebit----------	0-6	Stony fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	15-40	35-50	35-50	30-50	13-30	<26	NP-7
	6-16	Stony loam, stony fine sandy loam, bouldery fine sandy loam.	GM, GC, GM-GC	A-1, A-2, A-4	15-40	35-50	35-50	30-50	13-45	<35	NP-13
	16-25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
9---------- Ceda	0-12	Cherty silt loam	SM, GM, ML, GM-GC	A-2, A-4	0-10	35-75	35-75	35-70	30-70	22-30	2-7
	12-62	Very cherty loam, very cherty silt loam, very cherty clay loam.	GM, GP-GM, GM-GC	A-1, A-2, A-4, A-6	0-30	15-50	15-50	10-50	5-45	<40	NP-18
10---------- Ceda	0-10	Cherty silt loam	SM, GM, ML, GM-GC	A-2, A-4	0-10	35-75	35-75	35-70	30-70	22-30	2-7
	10-60	Very cherty loam, very cherty silt loam, very cherty clay loam.	GM, GP-GM, GM-GC	A-1, A-2, A-4, A-6	0-30	15-50	15-50	10-50	5-45	<40	NP-18
11*:											
Ceda----------	0-7	Gravelly fine sandy loam.	SM, GM, SM-SC, GM-GC	A-1, A-2, A-4	0-10	35-75	35-75	30-50	13-45	<26	NP-7
	7-72	Very gravelly loam, very gravelly fine sandy loam, cobbly clay loam.	GM, GP-GM, GM-GC	A-1, A-2, A-4, A-6	0-30	15-50	15-50	10-50	5-45	<40	NP-18

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
11*:											
Rubble land.											
12*:											
Clebit----------	0-5	Very gravelly fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	0-15	35-50	35-50	30-50	13-30	<26	NP-7
	5-12	Very gravelly loam, very gravelly fine sandy loam, very gravelly very fine sandy loam.	GM, GC, GM-GC	A-1, A-2, A-4	0-15	35-50	35-50	30-50	13-45	<35	NP-13
	12-16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Pirum----------	0-10	Fine sandy loam	SM, ML	A-4	0	75-100	75-100	70-90	36-65	<20	NP-3
	10-26	Sandy clay loam, clay loam, loam.	CL, CL-ML	A-4, A-6	0	75-100	75-100	70-90	50-70	22-35	5-15
	26-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
13*:											
Clebit----------	0-5	Bouldery fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	15-40	35-50	35-50	30-50	13-30	<26	NP-7
	5-14	Stony loam, stony fine sandy loam, bouldery fine sandy loam.	GM, GC, GM-GC	A-1, A-2, A-4	15-40	35-50	35-50	30-50	13-45	<35	NP-13
	14-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Pirum----------	0-12	Bouldery fine sandy loam.	SM, ML	A-4	10-35	75-100	75-100	70-90	36-65	<20	NP-3
	12-36	Sandy clay loam, clay loam, loam.	CL, CL-ML	A-4, A-6	0-10	75-100	75-100	70-90	50-70	22-35	5-15
	36-40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
14*:											
Clodine Variant	0-14	Cherty silt loam	CL, SC	A-4, A-6	0	50-75	50-75	50-75	40-70	30-37	8-13
	14-32	Very cherty silty clay loam, very cherty clay loam.	GC	A-2, A-4, A-6, A-7	0	15-50	15-50	15-50	13-50	33-43	12-20
	32-44	Very cherty silty clay loam, very cherty clay loam.	GC, GP-GC	A-2, A-4, A-6, A-7	0	10-50	10-50	10-50	8-50	33-43	12-20
	44-65	Very cherty loam, very cherty silty clay loam, very cherty clay loam.	GC, GP-GC	A-2	0	10-35	10-35	10-35	8-35	30-43	8-20
Wilburton Variant--------	0-26	Cherty loam------	CL, SC	A-2, A-4, A-6	0	50-75	50-75	40-75	30-65	30-37	9-14
	26-46	Cherty clay loam, cherty silty clay loam.	CL, SC	A-4, A-6, A-7	0	50-75	50-75	50-75	40-75	33-43	12-20
	46-65	Cherty loam, cherty clay loam, cherty silty clay loam.	CL, SC	A-2, A-4, A-6, A-7	0	50-75	50-75	40-75	30-75	30-43	9-20

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
15---------- Counts	0-8	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	98-100	96-100	65-97	20-40	4-18
	8-42	Clay, silty clay loam, clay loam.	CL, CH	A-7, A-6	0	98-100	98-100	96-100	80-99	37-70	15-41
	42-72	Clay, silty clay loam, clay loam.	CL, CH	A-7, A-6	0	95-100	95-100	90-100	80-99	37-70	15-38
16---------- Counts	0-13	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	98-100	96-100	65-97	20-40	4-18
	13-46	Clay, silty clay loam, clay loam.	CL, CH	A-7, A-6	0	98-100	98-100	96-100	80-99	37-70	15-41
	46-65	Clay, silty clay loam, clay loam.	CL, CH	A-7, A-6	0	95-100	95-100	90-100	80-99	37-70	15-38
17*: Counts----------	0-15	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	98-100	96-100	65-97	20-40	4-18
	15-52	Clay, silty clay loam, clay loam.	CL, CH	A-7, A-6	0	98-100	98-100	96-100	80-99	37-70	15-41
	52-65	Clay, silty clay loam, clay loam.	CL, CH	A-7, A-6	0	95-100	95-100	90-100	80-99	37-70	15-38
Rexor----------	0-8	Loam----------	ML, CL, CL-ML	A-4, A-6	0	98-100	98-100	96-100	65-97	22-37	3-14
	8-41	Clay loam, silt loam, silty clay loam.	CL	A-4, A-6	0	98-100	98-100	96-100	80-98	30-40	8-17
	41-60	Loam, silt loam	CL	A-4, A-6	0	98-100	98-100	96-100	70-97	30-37	8-14
18*: Counts----------	0-13	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	98-100	96-100	65-97	20-40	4-18
	13-51	Clay, silty clay loam, clay loam.	CL, CH	A-7, A-6	0	98-100	98-100	96-100	80-99	37-70	15-41
	51-72	Clay, silty clay loam, clay loam.	CL, CH	A-7, A-6	0	95-100	95-100	90-100	80-99	37-70	15-38
Wing----------	0-6	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	85-95	20-35	3-15
	6-72	Silty clay, silty clay loam.	CH, CL	A-7	0	100	100	95-100	90-100	45-70	20-45
19---------- Cupco	0-20	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	96-100	80-97	25-37	5-13
	20-35	Silty clay loam	CL	A-6, A-7	0	100	100	98-100	90-98	33-42	12-19
	35-80	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	96-100	80-98	33-43	12-20
20---------- Dela	0-12	Fine sandy loam	ML, CL, SM, SC	A-4	0	100	98-100	94-100	36-60	<30	NP-10
	12-36	Fine sandy loam, sandy loam, loam.	ML, CL, SM, SC	A-4	0	100	98-100	94-100	36-70	<30	NP-10
	36-72	Stratified fine sandy loam to loamy fine sand.	ML, CL, SM, SC	A-2, A-4	0	100	98-100	90-100	15-60	<30	NP-10
21*: Denman----------	0-6	Stony loam--------	ML, CL, CL-ML	A-4	25-55	75-90	75-90	65-90	50-75	22-30	2-10
	6-10	Stony loam, cobbly loam, stony clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0-30	60-90	60-90	50-90	40-80	25-40	4-18
	10-22	Clay loam, loam, gravelly clay loam.	CL, SC	A-4, A-6	0-25	55-90	55-90	50-90	36-80	30-40	9-18
	22-56	Clay, silty clay, shaly silty clay.	CL, CH	A-7	0	55-90	55-90	55-90	50-90	41-60	18-34
	56-80	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
21*:											
Carnasaw	0-10	Stony loam	ML, CL, SM, SC	A-4, A-2	25-40	85-95	85-95	75-95	30-95	<30	NP-10
	10-24	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0-10	85-95	85-95	75-95	70-95	37-65	18-35
	24-40	Clay, silty clay	CL, CH	A-7	0-10	85-95	85-95	80-95	70-95	41-65	18-35
	40-56	Gravelly silty clay, gravelly clay, clay.	CL, CH	A-7	0-10	55-90	55-90	55-90	50-90	41-65	18-35
	56-64	Weathered bedrock	---	---	---	---	---	---	---	---	---
22*:											
Freestone Variant	0-9	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0	95-100	95-100	95-100	36-60	<26	NP-7
	9-18	Fine sandy loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4	0	95-100	95-100	90-100	36-85	<31	NP-10
	18-72	Sandy clay loam, clay loam.	CL, SC	A-4, A-6	0	95-100	95-100	90-100	36-90	25-40	8-18
Bernow Variant	0-17	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0	95-100	95-100	95-100	36-60	<26	NP-7
	17-72	Clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	95-100	95-100	90-100	36-90	25-40	8-18
23 Kanima	0-8	Shaly silty clay loam.	CL, SC	A-6	0-10	50-75	50-75	50-75	40-75	33-40	12-20
	8-72	Very shaly clay loam, very shaly silty clay loam, very shaly loam.	GC, GP-GC	A-2, A-4, A-6	0-10	5-50	5-50	5-50	5-49	30-40	8-20
24*:											
Kenn	0-9	Loam	ML, CL, SM, SC	A-2, A-4, A-6	0	75-90	75-90	65-90	35-75	24-35	3-13
	9-34	Clay loam, sandy clay loam, gravelly clay loam.	CL, SC	A-2, A-4, A-6	0-15	50-90	50-90	35-90	15-80	25-40	8-18
	34-43	Very gravelly sandy clay loam, very gravelly clay loam, cobbly sandy clay loam.	GC, GP-GC	A-2, A-4, A-6	0-55	25-50	25-50	20-50	10-45	25-40	8-18
	43-60	Cobbly loam, very gravelly loam, very gravelly fine sandy loam.	GC, GM, GP-GC, GP-GM	A-1, A-2, A-4	15-65	15-50	15-50	10-50	5-45	<31	NP-10
Ceda	0-6	Gravelly loam	SM, GM, ML, GM-GC	A-1, A-2, A-4	0-10	35-75	35-75	35-60	20-65	22-29	2-7
	6-60	Very gravelly loam, very gravelly fine sandy loam, cobbly clay loam.	GM, GP-GM, GM-GC	A-1, A-2, A-4, A-6	0-30	15-50	15-50	10-50	5-45	<40	NP-18
25 Neff	0-18	Silt loam	CL	A-4, A-6	0	100	100	96-100	65-97	30-37	8-14
	18-35	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	96-100	80-98	30-42	11-19
	35-62	Silt loam, silty clay loam.	CL	A-4, A-6, A-7	0	100	100	96-100	80-98	30-42	8-19

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
26*:											
Neff	0-16	Silt loam	CL	A-4, A-6	0	100	100	96-100	65-97	30-37	8-14
	16-35	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	96-100	80-98	30-42	11-19
	35-62	Silt loam, silty clay loam.	CL	A-4, A-6, A-7	0	100	100	96-100	80-98	30-42	8-19
Rexor	0-10	Silt loam	ML, CL, CL-ML	A-4, A-6	0	98-100	98-100	96-100	65-97	22-37	3-14
	10-46	Clay loam, silt loam, silty clay loam.	CL	A-4, A-6	0	98-100	98-100	96-100	80-98	30-40	8-17
	46-68	Loam, silt loam	CL	A-4, A-6	0	98-100	98-100	96-100	70-97	30-37	8-14
27*:											
Octavia	0-16	Stony loam	CL, SC	A-4, A-6	25-40	60-90	60-90	55-90	40-75	30-35	9-13
	16-45	Clay loam, sandy clay loam, gravelly clay loam.	CL, SC	A-2, A-4, A-6	0-15	60-90	60-90	50-90	20-80	25-40	8-18
	45-65	Clay loam, clay, shaly clay loam.	CL, CH, SC	A-6, A-7	0-30	55-90	55-90	50-90	45-85	37-60	16-34
Carnasaw	0-10	Stony loam	ML, CL, SM, SC	A-4, A-2	25-40	85-95	85-95	75-95	30-95	<30	NP-10
	10-30	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0-10	85-95	85-95	75-95	70-95	37-65	18-35
	30-42	Gravelly silty clay, gravelly clay, clay.	CL, CH	A-7	0-10	55-90	55-90	55-90	50-90	41-65	18-35
	42-55	Weathered bedrock	---	---	---	---	---	---	---	---	---
Clebit	0-5	Stony fine sandy loam.	GM, GM-GC	A-1, A-2, A-4	15-40	35-50	35-50	30-50	13-30	<26	NP-7
	5-16	Stony loam, stony fine sandy loam, bouldery fine sandy loam.	GM, GC, GM-GC	A-1, A-2, A-4	15-40	35-50	35-50	30-50	13-45	<35	NP-13
	16-24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
28	0-13	Fine sandy loam	SM, ML	A-4	0	75-100	75-100	70-90	36-65	<20	NP-3
Pirum	13-30	Sandy clay loam, clay loam, loam.	CL, CL-ML	A-4, A-6	0	75-100	75-100	70-90	50-70	22-35	5-15
	30-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
29	0-12	Fine sandy loam	SM, ML	A-4	0	75-100	75-100	70-90	36-65	<20	NP-3
Pirum	12-31	Sandy clay loam, clay loam, loam.	CL, CL-ML	A-4, A-6	0	75-100	75-100	70-90	50-70	22-35	5-15
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
30*:											
Pirum	0-11	Stony fine sandy loam.	SM, ML	A-4	10-35	75-100	75-100	70-90	36-65	<20	NP-3
	11-36	Sandy clay loam, clay loam, loam.	CL, CL-ML	A-4, A-6	0-10	75-100	75-100	70-90	50-70	22-35	5-15
	36-43	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Carnasaw	0-9	Stony fine sandy loam.	ML, CL, SM, SC	A-4, A-2	25-40	85-95	85-95	75-95	30-95	<30	NP-10
	9-16	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0-10	85-95	85-95	75-95	70-95	37-65	18-35
	16-40	Clay, silty clay	CL, CH	A-7	0-10	85-95	85-95	80-95	70-95	41-65	18-35
	40-45	Gravelly silty clay, gravelly clay, clay.	CL, CH	A-7	0-10	55-90	55-90	55-90	50-90	41-65	18-35
	45-55	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
30*:											
Panama	0-15	Stony loam	GC, SC, CL, GM-GC	A-2, A-4	25-60	45-85	45-85	40-85	30-70	22-31	2-10
	15-49	Gravelly sandy clay loam, very gravelly sandy clay loam, gravelly clay loam.	GC, CL, SC	A-2, A-4, A-6, A-1	15-45	35-75	35-75	30-75	13-70	25-40	8-18
	49-77	Clay loam, shaly clay loam, clay.	GC, SC, CL, CH	A-2, A-6, A-7, A-1	0	25-90	25-90	25-85	20-85	37-60	16-34
31 Rexor	0-10	Silt loam	ML, CL, CL-ML	A-4, A-6	0	98-100	98-100	96-100	65-97	22-37	3-14
	10-32	Clay loam, silt loam, silty clay loam.	CL	A-4, A-6	0	98-100	98-100	96-100	80-98	30-40	8-17
	32-72	Loam, silt loam	CL	A-4, A-6	0	98-100	98-100	96-100	70-97	30-37	8-14
32 Sallisaw	0-8	Loam	CL, ML, SM, SC	A-2, A-4	0-15	75-100	75-100	70-100	25-97	<30	NP-10
	8-34	Loam, clay loam, sandy clay loam.	SC, CL	A-2, A-4, A-6	0	50-100	50-100	45-95	17-90	25-40	8-18
	34-72	Very gravelly loam, very gravelly silt loam, very gravelly clay loam.	GC	A-2, A-4, A-6	0-30	20-50	20-50	20-50	13-49	25-40	8-18
33 Shermore	0-6	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4, A-2	0	75-98	75-98	60-85	25-60	<26	NP-7
	6-30	Sandy clay loam, clay loam, loam.	CL, SC	A-4, A-6, A-2	0	75-98	75-98	60-90	25-90	25-40	8-18
	30-64	Sandy clay loam, clay loam, loam.	CL, SC	A-4, A-6, A-2	0	85-98	85-98	70-90	30-90	25-40	8-18
34 Shermore	0-14	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4, A-2	0	75-98	75-98	60-85	25-60	<26	NP-7
	14-36	Sandy clay loam, clay loam, loam.	CL, SC	A-4, A-6, A-2	0	75-98	75-98	60-90	25-90	25-40	8-18
	36-80	Sandy clay loam, clay loam, loam.	CL, SC	A-4, A-6, A-2	0	85-98	85-98	70-90	30-90	25-40	8-18
35 Shermore	0-6	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4, A-2	0	75-98	75-98	60-85	25-60	<26	NP-7
	6-36	Sandy clay loam, clay loam, loam.	CL, SC	A-4, A-6, A-2	0	75-98	75-98	60-90	25-90	25-40	8-18
	36-64	Sandy clay loam, clay loam, loam.	CL, SC	A-4, A-6, A-2	0	85-98	85-98	70-90	30-90	25-40	8-18
36 Sobol	0-7	Silt loam	CL	A-4, A-6	0-15	85-100	85-100	75-100	55-97	30-37	8-14
	7-14	Clay loam, silty clay loam.	CL	A-6, A-7	0	85-100	85-100	75-98	65-98	37-50	15-26
	14-24	Clay, silty clay	CL, CH	A-7	0	85-100	85-100	75-99	75-99	41-60	18-34
	24-36	Clay, shaly clay, silty clay.	CL, CH	A-7	0	55-100	55-100	55-100	51-99	41-60	18-34
	36-50	Weathered bedrock	---	---	---	---	---	---	---	---	---
37*:											
Sobol	0-6	Stony clay loam	CL	A-6, A-7	15-30	85-100	85-100	75-95	65-90	34-43	13-20
	6-10	Clay loam, silty clay loam.	CL	A-7, A-6	0	85-100	85-100	75-98	65-98	37-50	15-26
	10-28	Clay, silty clay	CL, CH	A-7	0	85-100	85-100	75-99	75-99	41-60	18-34
	28-38	Clay, shaly clay, silty clay.	CL, CH	A-7	0	55-100	55-100	55-100	51-99	41-60	18-34
	38-52	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
37*: Rock outcrop.											
38---------- Stigler	0-24	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	94-100	60-97	20-37	2-14
	24-36	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	100	100	96-100	80-99	37-70	15-38
	36-48	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	---	100	100	96-100	80-99	37-70	15-38
	48-72	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	---	100	100	96-100	80-99	37-70	15-38
39---------- Stigler	0-22	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	94-100	60-97	20-37	2-14
	22-35	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0	100	100	96-100	80-99	37-70	15-38
	35-55	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	---	100	100	96-100	80-99	37-70	15-38
	55-72	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	---	100	100	96-100	80-99	37-70	15-38
40---------- Tamaha	0-13	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	98-100	98-100	96-100	65-97	22-37	2-14
	13-19	Silt loam, clay loam, silty clay loam.	CL	A-4, A-6, A-7	0	95-100	95-100	95-100	80-98	30-42	8-19
	19-52	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0	98-100	98-100	96-100	80-99	37-70	15-38
	52-72	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	---	95-100	95-100	90-100	80-99	37-70	15-38
41---------- Tamaha	0-11	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	98-100	98-100	96-100	65-97	22-37	2-14
	11-18	Silt loam, clay loam, silty clay loam.	CL	A-4, A-6, A-7	0	95-100	95-100	95-100	80-98	30-42	8-19
	18-48	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0	98-100	98-100	96-100	80-99	37-70	15-38
	48-64	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	---	95-100	95-100	90-100	80-99	37-70	15-38
42*:											
Tuskahoma-------	0-6	Loam-------------	ML, CL, CL-ML	A-4	0	80-100	80-100	75-100	55-97	22-31	2-10
	6-12	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0	55-100	55-100	50-100	50-99	37-60	15-34
	12-18	Shaly silty clay, shaly clay, shaly silty clay loam.	CH, CL, GC	A-7, A-6, A-2	0	35-70	35-70	35-70	30-70	37-60	15-34
	18-25	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sobol-----------	0-10	Loam-------------	CL	A-4, A-6	0-15	85-100	85-100	75-100	55-97	30-37	8-14
	10-16	Clay loam, silty clay loam.	CL	A-6, A-7	0	85-100	85-100	75-98	65-98	37-50	15-26
	16-24	Clay, silty clay	CL, CH	A-7	0	85-100	85-100	75-99	75-99	41-60	18-34
	24-32	Clay, shaly clay, silty clay.	CL, CH	A-7	0	55-100	55-100	55-100	51-99	41-60	18-34
	32-37	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
43*:											
Tuskahoma	0-5	Stony loam	CL, ML, CL-ML	A-4	0-30	85-100	85-100	75-100	55-97	22-31	2-10
	5-10	Clay, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	55-100	55-100	50-100	50-99	37-60	15-34
	10-14	Shaly clay, shaly silty clay, shaly silty clay loam.	GC, CL, CH	A-2, A-6, A-7	0	35-70	35-70	35-70	30-70	37-60	15-34
	14-19	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sobol	0-6	Stony loam	CL	A-4, A-6	15-30	85-100	85-100	75-100	55-97	30-37	8-14
	6-10	Clay loam, silty clay loam.	CL	A-7, A-6	0	85-100	85-100	75-98	65-98	37-50	15-26
	10-20	Clay, silty clay	CL, CH	A-7	0	85-100	85-100	75-99	75-99	41-60	18-34
	20-24	Clay, shaly clay, silty clay.	CL, CH	A-7	0	55-100	55-100	55-100	51-99	41-60	18-34
	24-29	Weathered bedrock	---	---	---	---	---	---	---	---	---
44 Wilburton	0-6	Cobbly loam	ML, CL, CL-ML	A-4	10-30	90-100	90-100	75-90	55-85	20-30	2-10
	6-11	Cobbly fine sandy loam, cobbly sandy clay loam, cobbly clay loam.	ML, CL, SM, SC	A-2, A-4, A-6	25-40	75-90	75-90	70-85	25-75	<40	NP-18
	11-28	Gravelly clay loam, gravelly sandy clay loam, cobbly clay loam.	GC	A-2, A-4, A-6	25-45	40-55	40-55	30-55	15-50	25-40	7-18
	28-46	Gravelly loam, gravelly clay loam, gravelly sandy clay loam.	GC	A-2, A-4, A-6	40-55	40-55	40-55	30-55	15-50	25-40	7-18
	46-60	Gravelly fine sandy loam, gravelly loam, gravelly clay loam.	GC, GM, GM-GC	A-1, A-2, A-4, A-6	40-65	45-55	45-55	35-55	15-50	<40	NP-18
45 Wilburton	0-7	Cobbly loam	ML, CL, CL-ML	A-4	10-30	90-100	90-100	75-90	55-85	20-30	2-10
	7-13	Cobbly fine sandy loam, cobbly sandy clay loam, cobbly clay loam.	ML, CL, SM, SC	A-2, A-4, A-6	25-40	75-90	75-90	70-85	25-75	<40	NP-18
	13-36	Gravelly clay loam, gravelly sandy clay loam, cobbly clay loam.	GC	A-2, A-4, A-6	25-45	40-55	40-55	30-55	15-50	25-40	7-18
	36-52	Gravelly loam, gravelly clay loam, gravelly sandy clay loam.	GC	A-2, A-4, A-6	40-55	40-55	40-55	30-55	15-50	25-40	7-18
	52-80	Gravelly fine sandy loam, gravelly loam, gravelly clay loam.	GC, GM, GM-GC	A-1, A-2, A-4, A-6	40-65	45-55	45-55	35-55	15-50	<40	NP-18
46 Wister	0-12	Silt loam	ML, CL, CL-ML	A-4	0	97-100	97-100	96-100	70-97	22-30	2-10
	12-52	Silty clay, clay, silty clay loam.	CL, CH	A-7	0	95-100	95-100	95-100	85-99	41-65	18-35
	52-58	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
47----------	0-9	Silty clay loam	CL	A-6, A-7	---	100	100	98-100	90-98	37-50	15-25
Woodson Variant	9-62	Clay, silty clay	CL, CH	A-7	---	100	100	96-100	90-99	41-60	18-34
48----------	0-18	Cherty silt loam	ML, CL, GC, GM	A-2, A-4, A-6	20-30	45-75	45-75	40-75	35-70	22-35	2-14
Yanush	18-72	Very cherty clay loam, very cherty silty clay loam.	GC, CL	A-6, A-7, A-2	20-30	20-60	20-60	20-60	15-55	33-43	12-20
49----------	0-12	Cherty silt loam	ML, CL, GC, GM	A-2, A-4, A-6	20-30	45-75	45-75	40-75	35-70	22-35	2-14
Yanush	12-62	Very cherty clay loam, very cherty silty clay loam.	GC, CL	A-6, A-7, A-2	20-30	20-60	20-60	20-60	15-55	33-43	12-20
50----------	0-11	Cherty silt loam	ML, CL, GC, GM	A-2, A-4, A-6	20-30	45-75	45-75	40-75	35-70	22-35	2-14
Yanush	11-72	Very cherty clay loam, very cherty silty clay loam.	GC, CL	A-6, A-7, A-2	20-30	20-60	20-60	20-60	15-55	33-43	12-20
51*:											
Yanush----------	0-10	Cherty silt loam	ML, CL, GC, GM	A-2, A-4, A-6	20-30	45-75	45-75	40-75	35-70	22-35	2-14
	10-64	Very cherty clay loam, very cherty silty clay loam.	GC, CL	A-6, A-7, A-2	20-30	20-60	20-60	20-60	15-55	33-43	12-20
Sobol----------	0-7	Loam----------	CL	A-4, A-6	0-15	85-100	85-100	75-100	55-97	30-37	8-14
	7-11	Clay loam, silty clay loam.	CL	A-6, A-7	0	85-100	85-100	75-98	65-98	37-50	15-26
	11-19	Clay, silty clay	CL, CH	A-7	0	85-100	85-100	75-99	75-99	41-60	18-34
	19-28	Clay, shaly clay, silty clay.	CL, CH	A-7	0	55-100	55-100	55-100	51-99	41-60	18-34
	28-32	Weathered bedrock	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm^3	In/hr	In/in	pH				Pct
1*:										
Bengal----------	0-8	10-20	1.30-1.60	0.6-2.0	0.10-0.20	4.5-6.0	Low----------	0.32	3	.5-2
	8-24	40-60	1.35-1.60	0.06-0.2	0.10-0.18	4.5-5.5	High---------	0.32		
	24-32	40-60	1.35-1.60	0.06-0.2	0.06-0.18	4.5-5.5	High---------	0.32		
	32-37	---	---	---	---	---	----------	----		
Clebit----------	0-5	10-20	1.30-1.60	2.0-6.0	0.04-0.08	4.5-6.5	Low----------	0.17	1	.5-1
	5-16	10-20	1.30-1.60	2.0-6.0	0.04-0.10	4.5-6.5	Low----------	0.28		
	16-21	---	---	---	---	---	----------	----		
2*:										
Bengal----------	0-7	10-20	1.30-1.60	0.6-2.0	0.10-0.20	4.5-6.0	Low----------	0.32	3	.5-2
	7-10	27-40	1.45-1.70	0.2-2.0	0.10-0.20	4.5-5.5	Moderate-----	0.32		
	10-22	40-60	1.35-1.60	0.06-0.2	0.10-0.18	4.5-5.5	High---------	0.32		
	22-29	40-60	1.35-1.60	0.06-0.2	0.06-0.18	4.5-5.5	High---------	0.32		
	29-36	---	---	---	---	---	----------	----		
Denman----------	0-5	15-25	1.30-1.55	0.6-2.0	0.07-0.16	5.1-6.0	Low----------	0.32	4	.5-2
	5-10	18-30	1.40-1.70	0.6-2.0	0.10-0.12	4.5-6.0	Low----------	0.32		
	10-28	20-30	1.40-1.70	0.6-2.0	0.10-0.18	4.5-5.5	Moderate-----	0.28		
	28-46	45-60	1.35-1.65	0.06-0.2	0.08-0.17	4.5-5.5	High---------	0.28		
	46-57	---	---	---	---	---	----------	----		
3*:										
Bigfork----------	0-13	20-30	1.30-1.55	0.6-2.0	0.05-0.15	5.1-6.5	Low----------	0.32	2	.5-2
	13-28	27-35	1.45-1.70	0.6-2.0	0.05-0.15	4.5-6.0	Moderate-----	0.28		
	28-36	---	---	---	---	---	----------	----		
Yanush----------	0-12	18-26	1.30-1.55	0.6-2.0	0.08-0.17	5.6-6.5	Low----------	0.32	5	.5-2
	12-64	27-35	1.45-1.70	0.6-2.0	0.05-0.11	4.5-6.0	Moderate-----	0.28		
4*:										
Carnasaw--------	0-13	15-25	1.30-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low----------	0.32	4	.5-2
	13-29	35-45	1.45-1.70	0.2-0.6	0.12-0.20	4.5-5.5	High---------	0.37		
	29-37	40-60	1.35-1.60	0.06-0.2	0.12-0.18	4.5-5.5	High---------	0.32		
	37-46	40-60	1.35-1.60	0.06-0.2	0.07-0.15	4.5-5.5	High---------	0.32		
	46-55	---	---	---	---	---	----------	----		
Clebit----------	0-6	10-20	1.30-1.60	2.0-6.0	0.04-0.08	4.5-6.5	Low----------	0.17	1	.5-1
	6-12	10-20	1.30-1.60	2.0-6.0	0.04-0.10	4.5-6.5	Low----------	0.28		
	12-20	---	---	---	---	---	----------	----		
5*:										
Carnasaw--------	0-9	15-25	1.30-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low----------	0.32	4	.5-2
	9-14	35-45	1.45-1.70	0.2-0.6	0.12-0.20	4.5-5.5	High---------	0.37		
	14-24	40-60	1.35-1.60	0.06-0.2	0.12-0.18	4.5-5.5	High---------	0.32		
	24-42	40-60	1.35-1.60	0.06-0.2	0.07-0.15	4.5-5.5	High---------	0.32		
	42-55	---	---	---	---	---	----------	----		
Clebit----------	0-6	10-20	1.30-1.60	2.0-6.0	0.04-0.08	4.5-6.5	Low----------	0.17	1	.5-1
	6-10	10-20	1.30-1.60	2.0-6.0	0.04-0.10	4.5-6.5	Low----------	0.28		
	10-20	---	---	---	---	---	----------	----		
Pickens Variant-	0-6	15-25	1.30-1.55	0.6-2.0	0.04-0.13	5.1-6.5	Low----------	0.32	1	.5-1
	6-19	15-25	1.40-1.65	0.6-2.0	0.04-0.13	4.5-6.0	Low----------	0.32		
	19-24	---	---	---	---	---	----------	----		
6*:										
Carnasaw--------	0-9	15-25	1.30-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low----------	0.32	4	.5-2
	9-18	35-45	1.45-1.70	0.2-0.6	0.12-0.20	4.5-5.5	High---------	0.37		
	18-38	40-60	1.35-1.60	0.06-0.2	0.12-0.18	4.5-5.5	High---------	0.32		
	38-45	40-60	1.35-1.60	0.06-0.2	0.07-0.15	4.5-5.5	High---------	0.32		
	45-55	---	---	---	---	---	----------	----		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
6*:										
Clebit	0-4	10-20	1.30-1.60	2.0-6.0	0.04-0.08	4.5-6.5	Low	0.17	1	.5-1
	4-15	10-20	1.30-1.60	2.0-6.0	0.04-0.10	4.5-6.5	Low	0.28		
	15-20	---	---	---	---	---	---	---		
Rock outcrop.										
7*:										
Carnasaw	0-5	15-25	1.30-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low	0.43	4	.5-2
	5-12	35-45	1.45-1.70	0.2-0.6	0.12-0.20	4.5-5.5	High	0.37		
	12-32	40-60	1.35-1.60	0.06-0.2	0.12-0.18	4.5-5.5	High	0.32		
	32-45	40-60	1.35-1.60	0.06-0.2	0.07-0.15	4.5-5.5	High	0.32		
	45-60	---	---	---	---	---	---	---		
Pirum	0-13	18-27	1.30-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.24	3	.5-2
	13-32	18-35	1.25-1.60	0.6-2.0	0.14-0.18	4.5-5.5	Low	0.32		
	32-40	---	---	---	---	---	---	---		
8*:										
Carnasaw	0-8	15-25	1.30-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low	0.32	4	.5-2
	8-24	35-45	1.45-1.70	0.2-0.6	0.12-0.20	4.5-5.5	High	0.37		
	24-36	40-60	1.35-1.60	0.06-0.2	0.12-0.18	4.5-5.5	High	0.32		
	36-50	40-60	1.35-1.60	0.06-0.2	0.07-0.15	4.5-5.5	High	0.32		
	50-54	---	---	---	---	---	---	---		
Pirum	0-14	18-27	1.30-1.60	0.6-2.0	0.08-0.12	4.5-6.0	Low	0.20	3	.5-2
	14-34	18-35	1.25-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.32		
	34-38	---	---	---	---	---	---	---		
Clebit	0-6	10-20	1.30-1.60	2.0-6.0	0.04-0.08	4.5-6.5	Low	0.17	1	.5-1
	6-16	10-20	1.30-1.60	2.0-6.0	0.04-0.10	4.5-6.5	Low	0.28		
	16-25	---	---	---	---	---	---	---		
9	0-12	10-18	1.30-1.50	6.0-20	0.08-0.20	5.6-6.5	Low	0.28	5	.5-1
Ceda	12-62	15-32	1.40-1.70	6.0-20	0.02-0.16	5.6-6.5	Low	0.28		
10	0-10	10-18	1.30-1.50	6.0-20	0.08-0.20	5.6-6.5	Low	0.28	5	.5-1
Ceda	10-60	15-32	1.40-1.70	6.0-20	0.02-0.16	5.6-6.5	Low	0.28		
11*:										
Ceda	0-7	10-18	1.30-1.60	6.0-20	0.05-0.12	5.6-6.5	Low	0.17	5	.5-1
	7-72	15-32	1.40-1.70	6.0-20	0.02-0.16	5.6-6.5	Low	0.28		
Rubble land.										
12*:										
Clebit	0-5	10-20	1.30-1.60	2.0-6.0	0.04-0.08	4.5-6.5	Low	0.17	1	.5-1
	5-12	10-20	1.30-1.60	2.0-6.0	0.04-0.10	4.5-6.5	Low	0.28		
	12-16	---	---	---	---	---	---	---		
Pirum	0-10	18-27	1.30-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.24	3	.5-2
	10-26	18-35	1.25-1.60	0.6-2.0	0.14-0.18	4.5-5.5	Low	0.32		
	26-30	---	---	---	---	---	---	---		
13*:										
Clebit	0-5	10-20	1.30-1.60	2.0-6.0	0.04-0.08	4.5-6.5	Low	0.17	1	.5-1
	5-14	10-20	1.30-1.60	2.0-6.0	0.04-0.10	4.5-6.5	Low	0.28		
	14-20	---	---	---	---	---	---	---		
Pirum	0-12	18-27	1.30-1.60	0.6-2.0	0.08-0.12	4.5-6.0	Low	0.20	3	.5-2
	12-36	18-35	1.25-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.32		
	36-40	---	---	---	---	---	---	---		
Rock outcrop.										

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
14*:										
Clodine Variant-	0-14	15-26	1.30-1.50	0.6-2.0	0.08-0.18	4.5-6.5	Low	0.32	5	.5-2
	14-32	27-35	1.45-1.70	0.6-2.0	0.04-0.12	4.5-6.0	Moderate	0.28		
	32-44	27-35	1.45-1.70	0.6-2.0	0.02-0.12	4.5-6.0	Moderate	0.28		
	44-65	18-35	1.45-1.70	0.6-2.0	0.02-0.10	5.1-6.5	Moderate	0.28		
Wilburton Variant	0-26	15-26	1.30-1.55	0.6-2.0	0.08-0.15	4.5-6.5	Low	0.32	5	.5-2
	26-46	27-35	1.45-1.70	0.6-2.0	0.08-0.17	4.5-6.0	Moderate	0.28		
	46-65	18-35	1.45-1.70	0.6-2.0	0.08-0.17	4.5-6.0	Moderate	0.32		
15---	0-8	15-25	1.30-1.55	0.6-2.0	0.15-0.24	4.5-6.0	Low	0.49	5	1-3
Counts	8-42	35-60	1.35-1.65	<0.06	0.12-0.22	4.5-6.0	High	0.43		
	42-72	35-60	1.35-1.65	<0.06	0.08-0.20	5.6-8.4	High	0.49		
16---	0-13	15-25	1.30-1.55	0.6-2.0	0.15-0.24	4.5-6.0	Low	0.49	5	1-3
Counts	13-46	35-60	1.35-1.65	<0.06	0.12-0.22	4.5-6.0	High	0.43		
	46-65	35-60	1.35-1.65	<0.06	0.08-0.20	5.6-8.4	High	0.49		
17*:										
Counts	0-15	15-25	1.30-1.55	0.6-2.0	0.15-0.24	4.5-6.0	Low	0.49	5	1-3
	15-52	35-60	1.35-1.65	<0.06	0.12-0.22	4.5-6.0	High	0.43		
	52-65	35-60	1.35-1.65	<0.06	0.08-0.20	5.6-8.4	High	0.49		
Rexor	0-8	15-26	1.30-1.55	0.6-2.0	0.15-0.24	4.5-6.0	Low	0.37	5	1-3
	8-41	18-35	1.35-1.65	0.6-2.0	0.15-0.24	4.5-6.0	Moderate	0.37		
	41-60	18-27	1.40-1.65	0.6-2.0	0.15-0.24	4.5-6.0	Low	0.37		
18*:										
Counts	0-13	15-25	1.30-1.55	0.6-2.0	0.15-0.24	4.5-6.0	Low	0.49	5	1-3
	13-51	35-60	1.35-1.65	<0.06	0.12-0.22	4.5-6.0	High	0.43		
	51-72	35-60	1.35-1.65	<0.06	0.08-0.20	5.6-8.4	High	0.49		
Wing	0-6	15-25	1.30-1.55	0.2-0.6	0.16-0.24	5.6-6.5	Low	0.49	1	<.5
	6-72	35-60	1.35-1.65	<0.06	0.02-0.06	7.9-9.0	High	0.49		
19---	0-20	15-26	1.30-1.50	0.6-2.0	0.16-0.24	4.5-6.5	Low	0.37	5	.5-2
Cupco	20-35	27-35	1.45-1.75	0.2-0.6	0.18-0.22	4.5-6.5	Moderate	0.32		
	35-80	27-35	1.45-1.75	0.2-0.6	0.15-0.22	5.1-7.3	Moderate	0.32		
20---	0-12	5-18	1.30-1.60	2.0-6.0	0.10-0.15	5.1-7.3	Low	0.20	5	.5-1
Dela	12-36	5-18	1.50-1.70	2.0-6.0	0.10-0.20	5.1-7.3	Low	0.32		
	36-72	5-18	1.50-1.70	2.0-6.0	0.07-0.15	5.1-7.3	Low	0.20		
21*:										
Denman	0-6	15-25	1.30-1.55	0.6-2.0	0.07-0.16	5.1-6.0	Low	0.32	4	.5-2
	6-10	18-30	1.40-1.70	0.6-2.0	0.10-0.12	4.5-6.0	Low	0.32		
	10-22	20-30	1.40-1.70	0.6-2.0	0.10-0.18	4.5-5.5	Moderate	0.28		
	22-56	45-60	1.35-1.65	0.06-0.2	0.08-0.17	4.5-5.5	High	0.28		
	56-80	---	---	---	---	---	---	---		
Carnasaw	0-10	15-25	1.30-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low	0.32	4	.5-2
	10-24	35-45	1.45-1.70	0.2-0.6	0.12-0.20	4.5-5.5	High	0.37		
	24-40	40-60	1.35-1.60	0.06-0.2	0.12-0.18	4.5-5.5	High	0.32		
	40-56	40-60	1.35-1.60	0.06-0.2	0.07-0.15	4.5-5.5	High	0.32		
	56-64	---	---	---	---	---	---	---		
22*:										
Freestone Variant	0-9	10-18	1.30-1.60	0.6-2.0	0.11-0.15	4.5-6.0	Low	0.24	5	.5-1
	9-18	15-30	1.40-1.65	0.6-2.0	0.11-0.20	4.5-6.0	Low	0.32		
	18-72	20-35	1.45-1.70	0.2-0.6	0.12-0.20	4.5-6.0	Low	0.32		
Bernow Variant--	0-17	10-18	1.30-1.60	0.6-2.0	0.11-0.15	4.5-6.5	Low	0.24	5	.5-1
	17-72	20-35	1.45-1.70	0.2-0.6	0.12-0.20	4.5-6.0	Low	0.32		
23---	0-8	27-35	1.30-1.60	0.6-2.0	0.08-0.17	5.6-8.4	Low	0.28	4	.5-2
Kanima	8-72	18-35	1.40-1.70	0.6-2.0	0.02-0.12	5.6-8.4	Low	0.28		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
24*:										
Kenn	0-9	10-25	1.30-1.55	0.6-2.0	0.10-0.18	5.1-6.5	Low	0.37	5	.5-2
	9-34	20-30	1.45-1.70	0.6-2.0	0.06-0.18	4.5-5.5	Moderate	0.28		
	34-43	20-30	1.45-1.70	0.6-2.0	0.02-0.10	4.5-5.5	Moderate	0.28		
	43-60	10-25	1.40-1.70	0.6-2.0	0.02-0.05	4.5-5.5	Low	0.32		
Ceda	0-6	10-18	1.30-1.55	6.0-20	0.07-0.17	5.6-6.5	Low	0.28	5	.5-1
	6-60	15-32	1.40-1.70	6.0-20	0.02-0.16	5.6-6.5	Low	0.28		
25	0-18	15-26	1.30-1.55	0.6-2.0	0.15-0.24	4.5-6.0	Low	0.37	5	.5-3
Neff	18-35	25-35	1.40-1.70	0.2-0.6	0.16-0.24	4.5-6.5	Moderate	0.32		
	35-62	18-35	1.40-1.70	0.2-0.6	0.16-0.24	4.5-6.5	Moderate	0.32		
26*:										
Neff	0-16	15-26	1.30-1.55	0.6-2.0	0.15-0.24	4.5-6.0	Low	0.37	5	.5-3
	16-35	25-35	1.40-1.70	0.2-0.6	0.16-0.24	4.5-6.5	Moderate	0.32		
	35-62	18-35	1.40-1.70	0.2-0.6	0.16-0.24	4.5-6.5	Moderate	0.32		
Rexor	0-10	15-26	1.30-1.55	0.6-2.0	0.15-0.24	4.5-6.0	Low	0.37	5	1-3
	10-46	18-35	1.35-1.65	0.6-2.0	0.15-0.24	4.5-6.0	Moderate	0.37		
	46-68	18-27	1.40-1.65	0.6-2.0	0.15-0.24	4.5-6.0	Low	0.37		
27*:										
Octavia	0-16	15-20	1.30-1.55	0.6-2.0	0.10-0.19	4.5-6.0	Low	0.32	5	.5-1
	16-45	20-35	1.45-1.70	0.6-2.0	0.08-0.19	4.5-5.5	Low	0.28		
	45-65	35-60	1.35-1.65	0.2-0.6	0.08-0.19	4.5-5.5	Moderate	0.28		
Carnasaw	0-10	15-25	1.30-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low	0.32	4	.5-2
	10-30	35-45	1.45-1.70	0.2-0.6	0.12-0.20	4.5-5.5	High	0.37		
	30-42	40-60	1.35-1.60	0.06-0.2	0.07-0.15	4.5-5.5	High	0.32		
	42-55	---	---	---	---	---	---	---		
Clebit	0-5	10-20	1.30-1.60	2.0-6.0	0.04-0.08	4.5-6.5	Low	0.17	1	.5-1
	5-16	10-20	1.30-1.60	2.0-6.0	0.04-0.10	4.5-6.5	Low	0.28		
	16-24	---	---	---	---	---	---	---		
28	0-13	18-27	1.30-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.24	3	.5-2
Pirum	13-30	18-35	1.25-1.60	0.6-2.0	0.14-0.18	4.5-5.5	Low	0.32		
	30-36	---	---	---	---	---	---	---		
29	0-12	18-27	1.30-1.60	0.6-2.0	0.12-0.16	4.5-6.0	Low	0.24	3	.5-2
Pirum	12-31	18-35	1.25-1.60	0.6-2.0	0.14-0.18	4.5-5.5	Low	0.32		
	31-35	---	---	---	---	---	---	---		
30*:										
Pirum	0-11	18-27	1.30-1.60	0.6-2.0	0.08-0.12	4.5-6.0	Low	0.20	3	.5-2
	11-36	18-35	1.25-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.32		
	36-43	---	---	---	---	---	---	---		
Carnasaw	0-9	15-25	1.30-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low	0.32	4	.5-2
	9-16	35-45	1.45-1.70	0.2-0.6	0.12-0.20	4.5-5.5	High	0.37		
	16-40	40-60	1.35-1.60	0.06-0.2	0.12-0.18	4.5-5.5	High	0.32		
	40-45	40-60	1.35-1.60	0.06-0.2	0.07-0.15	4.5-5.5	High	0.32		
	45-55	---	---	---	---	---	---	---		
Panama	0-15	15-20	1.30-1.55	0.6-2.0	0.07-0.18	4.5-6.0	Low	0.24	5	.5-3
	15-49	20-35	1.45-1.70	0.6-2.0	0.04-0.12	4.5-5.5	Low	0.28		
	49-77	35-60	1.35-1.65	0.2-0.6	0.03-0.18	4.5-5.5	Moderate	0.24		
31	0-10	15-26	1.30-1.55	0.6-2.0	0.15-0.24	4.5-6.0	Low	0.37	5	1-3
Rexor	10-32	18-35	1.35-1.65	0.6-2.0	0.15-0.24	4.5-6.0	Moderate	0.37		
	32-72	18-27	1.40-1.65	0.6-2.0	0.15-0.24	4.5-6.0	Low	0.37		
32	0-8	12-20	1.30-1.60	0.6-2.0	0.10-0.20	5.6-7.3	Low	0.37	4	.5-2
Sallisaw	8-34	15-35	1.40-1.70	0.6-2.0	0.11-0.18	4.5-6.0	Low	0.32		
	34-72	22-35	1.40-1.70	0.6-2.0	0.06-0.10	4.5-6.0	Low	0.28		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
33----------	0-6	10-15	1.30-1.60	2.0-6.0	0.08-0.15	5.1-6.5	Low----------	0.24	5	.5-2
Shermore	6-30	18-35	1.45-1.70	0.6-2.0	0.07-0.15	4.5-6.0	Low----------	0.37		
	30-64	18-38	1.55-1.75	0.2-0.6	0.05-0.10	4.5-6.0	Low----------	0.32		
34----------	0-14	10-15	1.30-1.60	2.0-6.0	0.08-0.15	5.1-6.5	Low----------	0.24	5	.5-2
Shermore	14-36	18-35	1.45-1.70	0.6-2.0	0.07-0.15	4.5-6.0	Low----------	0.37		
	36-80	18-38	1.55-1.75	0.2-0.6	0.05-0.10	4.5-6.0	Low----------	0.32		
35----------	0-6	10-15	1.30-1.60	2.0-6.0	0.08-0.15	5.1-6.5	Low----------	0.24	5	.5-2
Shermore	6-36	18-35	1.45-1.70	0.6-2.0	0.07-0.15	4.5-6.0	Low----------	0.37		
	36-64	18-38	1.55-1.75	0.2-0.6	0.05-0.10	4.5-6.0	Low----------	0.32		
36----------	0-7	18-26	1.30-1.55	0.6-2.0	0.15-0.24	5.1-6.5	Low----------	0.43	3	.5-2
Sobol	7-14	35-40	1.45-1.70	0.2-0.6	0.15-0.20	4.5-6.5	Moderate-----	0.37		
	14-24	40-60	1.35-1.60	0.06-0.2	0.12-0.18	4.5-6.5	High---------	0.32		
	24-36	40-60	1.35-1.60	0.06-0.2	0.08-0.16	5.6-8.4	High---------	0.27		
	36-50	---	---	---	---	---	----------	----		
37*:										
Sobol----------	0-6	27-35	1.30-1.60	0.2-0.6	0.15-0.20	5.1-6.5	Moderate-----	0.32	3	.5-2
	6-10	35-40	1.45-1.70	0.2-0.6	0.15-0.20	4.5-6.5	Moderate-----	0.32		
	10-28	40-60	1.35-1.60	0.06-0.2	0.12-0.18	4.5-6.5	High---------	0.32		
	28-38	40-60	1.35-1.60	0.06-0.2	0.08-0.16	5.6-8.4	High---------	0.27		
	38-52	---	---	---	---	---	----------	----		
Rock outcrop.										
38----------	0-24	10-20	1.30-1.55	0.6-2.0	0.13-0.24	4.5-5.5	Low----------	0.49	5	1-3
Stigler	24-36	35-60	1.35-1.65	<0.06	0.12-0.22	4.5-6.0	High---------	0.43		
	36-48	35-60	1.35-1.65	<0.06	0.12-0.22	5.1-7.8	High---------	0.43		
	48-72	35-60	1.35-1.65	<0.06	0.08-0.20	5.1-7.8	High---------	0.49		
39----------	0-22	10-20	1.30-1.55	0.6-2.0	0.13-0.24	4.5-5.5	Low----------	0.49	5	1-3
Stigler	22-35	35-60	1.35-1.65	<0.06	0.12-0.22	4.5-6.0	High---------	0.43		
	35-55	35-60	1.35-1.65	<0.06	0.12-0.22	5.1-7.8	High---------	0.43		
	55-72	35-60	1.35-1.65	<0.06	0.08-0.20	5.1-7.8	High---------	0.49		
40----------	0-13	10-25	1.30-1.55	0.6-2.0	0.15-0.24	4.5-6.5	Low----------	0.49	5	1-3
Tamaha	13-19	20-35	1.40-1.70	0.2-2.0	0.15-0.22	4.5-6.0	Moderate-----	0.49		
	19-52	35-60	1.35-1.65	<0.06	0.14-0.20	4.5-6.0	High---------	0.43		
	52-72	35-60	1.35-1.65	<0.06	0.08-0.20	5.1-7.3	High---------	0.49		
41----------	0-11	10-25	1.30-1.55	0.6-2.0	0.15-0.24	4.5-6.5	Low----------	0.49	5	1-3
Tamaha	11-18	20-35	1.40-1.70	0.2-2.0	0.15-0.22	4.5-6.0	Moderate-----	0.49		
	18-48	35-60	1.35-1.65	<0.06	0.14-0.20	4.5-6.0	High---------	0.43		
	48-64	35-60	1.35-1.65	<0.06	0.08-0.20	5.1-7.3	High---------	0.49		
42*:										
Tuskahoma-------	0-6	10-18	1.30-1.55	0.2-2.0	0.15-0.24	5.6-7.8	Low----------	0.49	1	.5-2
	6-12	35-60	1.35-1.60	<0.06	0.08-0.20	5.1-7.8	High---------	0.37		
	12-18	35-60	1.35-1.60	<0.06	0.05-0.15	5.6-7.8	High---------	0.32		
	18-25	---	---	---	---	---	----------	----		
Sobol----------	0-10	18-26	1.30-1.55	0.6-2.0	0.15-0.24	5.1-6.5	Low----------	0.43	3	.5-2
	10-16	35-40	1.45-1.70	0.2-0.6	0.15-0.20	4.5-6.5	Moderate-----	0.37		
	16-24	40-60	1.35-1.60	0.06-0.2	0.12-0.18	4.5-6.5	High---------	0.32		
	24-32	40-60	1.35-1.60	0.06-0.2	0.08-0.16	5.6-8.4	High---------	0.27		
	32-37	---	---	---	---	---	----------	----		
43*:										
Tuskahoma-------	0-5	10-18	1.30-1.55	0.2-2.0	0.15-0.24	5.6-7.8	Low----------	0.49	1	.5-2
	5-10	35-60	1.35-1.60	<0.06	0.08-0.20	5.1-7.8	High---------	0.32		
	10-14	35-60	1.35-1.60	<0.06	0.05-0.15	5.6-7.8	High---------	0.32		
	14-19	---	---	---	---	---	----------	----		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm³	In/hr	In/in	pH				Pct
43*:										
Sobol	0-6	18-26	1.30-1.55	0.6-2.0	0.15-0.24	5.1-6.5	Low	0.37	3	.5-2
	6-10	35-40	1.45-1.70	0.2-0.6	0.15-0.20	4.5-6.5	Moderate	0.32		
	10-20	40-60	1.35-1.60	0.06-0.2	0.12-0.18	4.5-6.5	High	0.32		
	20-24	40-60	1.35-1.60	0.06-0.2	0.08-0.16	5.6-8.4	High	0.27		
	24-29	---	---	---	---	---	---	---		
44	0-6	15-25	1.30-1.55	0.6-2.0	0.10-0.18	5.1-6.5	Low	0.32	4	.5-2
Wilburton	6-11	10-30	1.45-1.70	0.6-2.0	0.06-0.16	5.1-6.5	Low	0.28		
	11-28	20-30	1.45-1.70	0.6-2.0	0.05-0.11	4.5-6.0	Low	0.28		
	28-46	20-30	1.45-1.70	0.6-2.0	0.05-0.11	4.5-6.0	Low	0.28		
	46-60	15-30	1.45-1.70	0.6-2.0	0.05-0.11	5.1-6.5	Low	0.28		
45	0-7	15-25	1.30-1.55	0.6-2.0	0.10-0.18	5.1-6.5	Low	0.32	4	.5-2
Wilburton	7-13	10-30	1.45-1.70	0.6-2.0	0.06-0.16	5.1-6.5	Low	0.28		
	13-36	20-30	1.45-1.70	0.6-2.0	0.05-0.11	4.5-6.0	Low	0.28		
	36-52	20-30	1.45-1.70	0.6-2.0	0.05-0.11	4.5-6.0	Low	0.28		
	52-80	15-30	1.45-1.70	0.6-2.0	0.05-0.11	5.1-6.5	Low	0.28		
46	0-12	15-26	1.30-1.55	0.6-2.0	0.16-0.24	4.5-6.5	Low	0.43	4	.5-1
Wister	12-52	35-60	1.35-1.65	<0.06	0.14-0.22	4.5-8.4	High	0.37		
	52-58	---	---	---	---	---	---	---		
47	0-9	27-35	1.30-1.60	0.2-0.6	0.18-0.22	5.6-7.3	Moderate	0.37	5	1-3
Woodson Variant	9-62	40-60	1.35-1.60	<0.06	0.12-0.18	5.6-8.4	High	0.32		
48	0-18	18-26	1.30-1.55	0.6-2.0	0.08-0.17	5.6-6.5	Low	0.32	5	.5-2
Yanush	18-72	27-35	1.45-1.70	0.6-2.0	0.05-0.11	4.5-6.0	Moderate	0.28		
49	0-12	18-26	1.30-1.55	0.6-2.0	0.08-0.17	5.6-6.5	Low	0.32	5	.5-2
Yanush	12-62	27-35	1.45-1.70	0.6-2.0	0.05-0.11	4.5-6.0	Moderate	0.28		
50	0-11	18-26	1.30-1.55	0.6-2.0	0.08-0.17	5.6-6.5	Low	0.32	5	.5-2
Yanush	11-72	27-35	1.45-1.70	0.6-2.0	0.05-0.11	4.5-6.0	Moderate	0.28		
51*:										
Yanush	0-10	18-26	1.30-1.55	0.6-2.0	0.08-0.17	5.6-6.5	Low	0.32	5	.5-2
	10-64	27-35	1.45-1.70	0.6-2.0	0.05-0.11	4.5-6.0	Moderate	0.28		
Sobol	0-7	18-26	1.30-1.55	0.6-2.0	0.15-0.24	5.1-6.5	Low	0.43	3	.5-2
	7-11	35-40	1.45-1.70	0.2-0.6	0.15-0.20	4.5-6.5	Moderate	0.37		
	11-19	40-60	1.35-1.60	0.06-0.2	0.12-0.18	4.5-6.5	High	0.32		
	19-28	40-60	1.35-1.60	0.06-0.2	0.08-0.16	5.6-8.4	High	0.27		
	28-32	---	---	---	---	---	---	---		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
1*:											
Bengal	C	None	---	---	>6.0	---	---	20-40	Soft	High	High.
Clebit	D	None	---	---	>6.0	---	---	10-20	Hard	Low	Moderate.
2*:											
Bengal	C	None	---	---	>6.0	---	---	20-40	Soft	High	High.
Denman	C	None	---	---	>6.0	---	---	40-60	Soft	High	High.
3*:											
Bigfork	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High.
Yanush	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
4*:											
Carnasaw	C	None	---	---	>6.0	---	---	40-60	Soft	High	High.
Clebit	D	None	---	---	>6.0	---	---	10-20	Hard	Low	Moderate.
5*:											
Carnasaw	C	None	---	---	>6.0	---	---	40-60	Soft	High	High.
Clebit	D	None	---	---	>6.0	---	---	10-20	Hard	Low	Moderate.
Pickens Variant	D	None	---	---	>6.0	---	---	10-20	Soft	Low	Moderate.
6*:											
Carnasaw	C	None	---	---	>6.0	---	---	40-60	Soft	High	High.
Clebit	D	None	---	---	>6.0	---	---	10-20	Hard	Low	Moderate.
Rock outcrop.											
7*:											
Carnasaw	C	None	---	---	>6.0	---	---	40-60	Soft	High	High.
Pirum	B	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
8*:											
Carnasaw	C	None	---	---	>6.0	---	---	40-60	Soft	High	High.
Pirum	B	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
Clebit	D	None	---	---	>6.0	---	---	10-20	Hard	Low	Moderate.
9--- Ceda	B	Occasional	Very brief	Jan-Jul	>6.0	---	---	>60	---	Low	Moderate.
10--- Ceda	B	Frequent	Very brief	Jan-Jul	>6.0	---	---	>60	---	Low	Moderate.
11*:											
Ceda	B	Frequent	Very brief	Jan-Jul	>6.0	---	---	>60	---	Low	Moderate.
Rubble land.											
12*:											
Clebit	D	None	---	---	>6.0	---	---	10-20	Hard	Low	Moderate.
Pirum	B	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
13*:											
Clebit	D	None	---	---	>6.0	---	---	10-20	Hard	Low	Moderate.
Pirum	B	None	---	---	>6.0	---	---	20-40	Hard	Low	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
13*: Rock outcrop.											
14*:											
Clodine Variant--	D	None	---	---	0.5-1.5	Perched	Nov-Jun	>60	---	High	Moderate.
Wilburton Variant	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate.
15, 16--Counts	C	None	---	---	1.0-2.0	Perched	Nov-Jun	>60	---	High	Moderate.
17*:											
Counts	C	None	---	---	1.0-2.0	Perched	Nov-Jun	>60	---	High	Moderate.
Rexor	A	Frequent	Very brief	Jan-Jul	3.0-5.0	Perched	Nov-Jun	>60	---	Moderate	Moderate.
18*:											
Counts	C	None	---	---	1.0-2.0	Perched	Nov-Jun	>60	---	Hign	Moderate.
Wing	D	None	---	---	0.5-1.0	Perched	Nov-Jun	>60	---	High	Moderate.
19--Cupco	C	Occasional	Very brief to brief.	Jan-Jul	0.5-2.0	Perched	Nov-Jun	>60	---	High	Moderate.
20--Dela	B	Occasional	Very brief	Jan-Jun	3.0-5.0	Apparent	Nov-Jun	>60	---	Moderate	Moderate.
21*:											
Denman	C	None	---	---	>6.0	---	---	40-60	Soft	High	High.
Carnasaw	C	None	---	---	>6.0	---	---	40-60	Soft	High	High.
22*:											
Freestone Variant	C	None	---	---	1.5-2.0	Perched	Nov-Jun	>60	---	Moderate	Moderate.
Bernow Variant---	C	None	---	---	3.0-4.0	Perched	Nov-Jun	>60	---	Moderate	Moderate.
23--Kanima	C	None	---	---	>6.0	---	---	>60	---	Moderate	Low.
24*:											
Kenn	B	Occasional	Very brief	Jan-Jul	>6.0	---	---	>60	---	Moderate	Moderate.
Ceda	B	Occasional	Very brief	Jan-Jul	>6.0	---	---	>60	---	Low	Moderate.
25--Neff	C	Occasional	Very brief to brief.	Jan-Jul	0.5-2.5	Perched	Nov-Jun	>60	---	High	Moderate.
26*:											
Neff	C	Frequent	Very brief to brief.	Jan-Jul	0.5-2.5	Perched	Nov-Jun	>60	---	High	Moderate.
Rexor	A	Frequent	Very brief	Jan-Jul	3.0-5.0	Perched	Nov-Jun	>60	---	Moderate	Moderate.
27*:											
Octavia	B	None	---	---	3.5-5.0	Perched	Nov-Jun	>60	---	Moderate	High.
Carnasaw	C	None	---	---	>6.0	---	---	40-60	Soft	High	High.
Clebit	D	None	---	---	>6.0	---	---	10-20	Hard	Low	Moderate.
28, 29--Pirum	B	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
30*:											
Pirum	B	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
Carnasaw	C	None	---	---	>6.0	---	---	40-60	Soft	High	High.
Panama	B	None	---	---	3.5-5.0	Perched	Nov-Jun	>60	---	Moderate	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
31--Rexor	A	Occasional	Very brief	Jan-Jul	3.0-5.0	Perched	Nov-Jun	>60	---	Moderate	Moderate.
32--Sallisaw	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
33, 34, 35--Shermore	B	None	---	---	1.0-3.5	Perched	Nov-Jun	>60	---	Moderate	High.
36--Sobol	C	None	---	---	0.5-1.5	Perched	Nov-Jun	20-40	Soft	High	High.
37*:											
Sobol	C	None	---	---	0.5-1.5	Perched	Nov-Jun	20-40	Soft	High	High.
Rock outcrop.											
38, 39--Stigler	C	None	---	---	2.0-3.0	Perched	Nov-Jun	>60	---	High	High.
40, 41--Tamaha	C	None	---	---	1.0-2.0	Perched	Nov-Jun	>60	---	High	High.
42*, 43*:											
Tuskahoma	D	None	---	---	0.5-1.5	Perched	Nov-Jun	10-20	Soft	High	Moderate.
Sobol	C	None	---	---	0.5-1.5	Perched	Nov-Jun	20-40	Soft	High	High.
44, 45--Wilburton	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
46--Wister	C	None	---	---	1.0-2.0	Perched	Nov-Jun	40-60	Soft	High	Moderate.
47--Woodson Variant	C	None	---	---	0-1.0	Perched	Nov-Jun	>60	---	High	High.
48, 49, 50--Yanush	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
51*:											
Yanush	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Sobol	C	None	---	---	0.5-1.5	Perched	Nov-Jun	20-40	Soft	High	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS

Soil series and sample number	Depth	Horizon	Particle-size distribution							
			Very coarse sand (2.0-1.0 mm)	Coarse sand (1.0-0.5 mm)	Medium sand (0.5-0.25 mm)	Fine sand (0.25-0.10 mm)	Very fine sand (0.10-0.05 mm)	Total sand (2.0-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)
	In		Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct
Counts:[1]										
75-OK-39-1-1	0-7	A1	1.8	2.4	2.2	4.0	5.4	15.8	65.8	18.4
75-OK-39-1-2	7-14	A2	2.3	2.9	2.3	4.1	5.4	17.0	61.5	21.5
75-OK-39-1-3	14-27	B21t	0.6	0.4	0.4	1.5	2.4	5.4	36.8	57.8
75-OK-39-1-4	27-40	B22t	0.5	0.5	0.6	2.0	2.8	6.3	41.7	51.9
75-OK-39-1-5	40-63	B23t	0.2	0.3	0.7	6.7	3.9	11.8	46.0	42.1
75-OK-39-1-6	63-70	IIB3	7.3	4.4	2.7	7.2	5.3	27.0	37.8	35.1
75-OK-39-1-7	70-90	IICr	0.4	0.4	0.4	0.6	2.3	4.1	55.7	40.2
Cupco:[2]										
78-OK-39-3-1	0-8	A11	1.2	3.5	3.7	2.2	1.1	11.6	57.5	30.9
78-OK-39-3-2	8-14	A12	0.9	2.7	1.8	1.4	0.9	7.8	60.6	31.6
78-OK-39-3-3	14-20	A2	2.9	4.0	2.4	1.9	1.2	12.4	59.3	28.3
78-OK-39-3-4	20-35	B21t	1.7	1.7	2.0	1.6	1.2	8.2	57.2	34.6
78-OK-39-3-5	35-57	B22t	0.7	0.9	1.1	2.6	1.7	6.9	57.9	35.2
78-OK-39-3-6	57-72	B3	0.9	1.4	1.6	2.3	1.8	8.0	58.0	34.0
78-OK-39-3-7	72-80	B3	0.5	0.5	1.0	4.0	2.8	9.0	57.2	33.8
Neff:[3]										
74-OK-39-2-1	0-10	A1	0.1	0.1	0.3	12.4	20.4	33.2	51.7	15.0
74-OK-39-2-2	10-15	B1	0.1	0.1	0.1	5.2	13.9	19.3	55.6	25.0
74-OK-39-2-3	15-30	B21t	0.1	0.1	0.4	6.9	10.4	17.9	55.2	26.9
74-OK-39-2-4	30-50	B22t	0.1	0.1	0.2	1.0	5.3	6.5	59.0	34.4
74-OK-39-2-5	50-62	B23t	0.1	0.1	0.3	2.0	6.5	8.9	59.8	31.3
74-OK-39-2-6	62-82	B3	0.1	0.1	0.3	1.5	5.5	7.5	63.0	29.4
Rexor:[4]										
75-OK-39-4-1	0-10	A1	0.1	0.1	0.2	9.3	17.0	26.7	62.3	11.0
75-OK-39-4-2	10-29	B21t	0.1	0.1	0.3	8.4	16.6	25.5	54.4	20.0
75-OK-39-4-3	29-48	B22t	0.1	0.1	0.2	8.8	20.0	29.2	54.5	16.3
75-OK-39-4-4	48-64	IIB23t	0.1	0.1	0.3	17.6	21.7	39.8	49.6	10.7
75-OK-39-4-5	64-80	IIB3	0.1	0.1	0.5	22.9	25.3	48.8	41.2	10.0
75-OK-39-4-6	64-80	IIA2	0.1	0.1	0.5	27.1	24.7	52.5	41.8	5.7
Sallisaw:[5]										
75-OK-39-5-1	0-6	A1	0.1	0.3	4.1	24.6	19.1	48.3	45.4	6.3
75-OK-39-5-2	6-17	B1	0.1	0.2	3.4	20.3	16.9	40.8	49.1	10.0
75-OK-39-5-3	17-28	B21t	0.4	0.5	2.9	16.0	13.7	33.3	44.1	22.6
75-OK-39-5-4	28-54	IIB2t	12.3	6.5	4.3	9.9	8.9	41.9	33.1	25.1
75-OK-39-5-5	54-80	IIB3	0.1	1.1	17.1	32.1	11.8	62.1	20.3	17.6

See footnotes at end of table.

TABLE 18.--PHYSICAL ANALYSES OF SELECTED SOILS--Continued

Soil series and sample number	Depth	Horizon	Particle-size distribution							
			Very coarse sand (2.0-1.0 mm)	Coarse sand (1.0-0.5 mm)	Medium sand (0.5-0.25 mm)	Fine sand (0.25-0.10 mm)	Very fine sand (0.10-0.05 mm)	Total sand (2.0-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)
	In		Pct	Pct	Pct	Pct	Pct	Pct	Pct	Pct
Shermore:[6]										
75-OK-39-3-1	0-9	A1	0.1	0.3	1.9	19.2	19.8	41.2	43.0	15.7
75-OK-39-3-2	9-19	B21t	0.1	0.1	1.2	13.3	14.5	29.1	45.5	25.4
75-OK-39-3-3	19-36	B22t	0.1	0.2	1.4	13.8	15.4	30.8	41.3	27.9
75-OK-39-3-4	36-50	Bx1	0.1	0.1	0.9	13.6	15.7	30.5	39.7	29.9
75-OK-39-3-5	50-60	Bx2	0.1	0.1	1.4	19.5	17.4	38.5	33.9	27.5
75-OK-39-3-6	60-72	Bx3	0.1	0.1	1.9	18.8	18.3	39.1	33.9	26.9
75-OK-39-3-7	72-86	C	0.1	0.1	10.1	33.6	11.1	55.0	18.7	26.3
Sobol:[7]										
75-OK-39-2-1	0-9	A1	0.1	3.4	6.4	8.9	12.3	31.0	47.7	21.3
75-OK-39-2-2	9-15	B1t	0.1	2.8	3.6	4.9	5.5	16.8	43.1	40.0
75-OK-39-2-3	15-24	B21t	0.1	1.6	2.0	2.6	2.8	9.1	40.9	50.0
75-OK-39-2-4	24-40	B22t	0.1	0.3	0.8	1.3	1.8	4.2	47.0	48.8
75-OK-39-2-5	40-72	Cr	0.1	1.3	2.4	2.7	4.0	10.5	56.4	33.2

[1]This pedon is not typical for the series. It is a taxadjunct to the Counts series because the clay content decreases by slightly more than 20 percent of the maximum within a depth of 60 inches.

[2]The B3 horizon was subdivided for sampling purposes.

[3]This pedon is not typical for the series. It is a taxadjunct to the Neff series because the pH and the base saturation of the solum are slightly higher than allowed for the series.

[4]A IIB3&A2 horizon is between depths of 64 and 80 inches. In sampling, the IIB3 part and the IIA2 part were separated. This pedon is not typical for the series.

[5]This pedon is not typical for the series. It is a taxadjunct to the Sallisaw series because the clay content decreases by slightly more than 20 percent of the maximum within a depth of 60 inches and depth to coarse fragments is less than allowed for the series.

[6]This pedon is not typical for the series.

[7]This pedon is not typical for the series. It is a taxadjunct to the Sobol series because the surface layer is slightly darker than allowed for the series.

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS

Soil series and sample number	Depth	Horizon	Extractable bases (milliequivalents per 100 grams of soil)				Cation exchange capacity	Base saturation	Reaction 1:1 soil:water	Organic matter	Total phosphorus
			Ca	Mg	K	Na					
	In							Pct	pH	Pct	P/m
Counts:[1]											
75-OK-39-1-1	0-7	A1	7.55	2.16	0.15	0.26	15.8	66.1	6.7	3.58	198.5
75-OK-39-1-2	7-14	A2	2.93	2.50	0.13	0.52	14.6	39.4	6.3	0.98	138.9
75-OK-39-1-3	14-27	B21t	7.21	13.31	0.28	3.35	37.3	66.4	5.9	1.24	99.3
75-OK-39-1-4	27-40	B22t	7.59	14.08	0.27	4.61	32.7	78.5	6.4	0.88	119.1
75-OK-39-1-5	40-63	B23t	8.40	14.50	0.21	6.00	27.8	87.5	6.8	0.48	198.5
75-OK-39-1-6	63-70	IIB3	5.00	8.69	0.18	3.61	20.6	86.0	7.5	0.20	357.2
75-OK-39-1-7	70-90	IICr	34.09	11.66	0.21	2.61	16.6	94.9	8.5	0.56	416.7
Cupco:[2]											
78-OK-39-3-1	0-8	A11	5.49	3.67	0.33	0.55	22.0	37.5	4.7	2.40	654.0
78-OK-39-3-2	8-14	A12	4.10	3.46	0.30	0.56	21.1	35.0	4.7	1.40	574.8
78-OK-39-3-3	14-20	A2	2.20	2.42	0.29	0.67	18.7	26.4	4.5	0.84	442.8
78-OK-39-3-4	20-35	B21t	1.99	3.24	0.33	1.06	21.9	26.5	4.7	0.57	335.5
78-OK-39-3-5	35-57	B22t	3.02	6.52	0.35	2.72	25.4	47.5	5.0	0.54	363.3
78-OK-39-3-6	57-72	B31	5.79	11.40	0.40	5.62	26.8	71.1	5.1	0.38	484.8
78-OK-39-3-7	72-80	B32	28.64	13.39	0.43	5.82	23.4	89.8	5.9	0.36	429.5
Neff:[3]											
74-OK-39-2-1	0-10	A1	2.18	1.60	0.10	0.13	6.6	46.9	5.4	1.47	---
74-OK-39-2-2	10-15	B1	2.48	1.55	0.10	0.17	9.8	33.6	5.2	1.38	---
74-OK-39-2-3	15-30	B21t	3.28	4.03	0.10	0.52	11.1	60.8	5.8	0.51	---
74-OK-39-2-4	30-50	B22t	6.09	6.93	0.21	1.13	16.8	77.1	7.0	0.46	---
74-OK-39-2-5	50-62	B23t	6.47	6.17	0.21	1.31	15.7	81.9	7.5	0.46	---
74-OK-39-2-6	62-82	B3	5.75	6.34	0.21	1.22	15.5	81.2	7.6	0.48	---
Rexor:[4]											
75-OK-39-4-1	0-10	A1	3.86	2.08	0.21	0.09	8.2	59.4	6.5	1.15	236.2
75-OK-39-4-2	10-29	B21t	5.34	2.80	0.21	0.13	12.7	71.3	6.6	0.96	219.3
75-OK-39-4-3	29-48	B22t	2.29	2.59	0.13	0.13	11.1	58.2	5.6	0.52	180.6
75-OK-39-4-4	48-64	IIB23t	0.98	2.63	0.13	0.13	8.6	60.2	5.2	0.59	148.9
75-OK-39-4-5	64-80	IIB3t	1.10	2.59	0.13	0.13	8.4	55.8	5.1	0.51	170.7
75-OK-39-4-6	64-80	IIA2	0.64	0.76	0.08	0.13	4.4	44.7	5.2	0.42	109.2
Sallisaw:[5]											
75-OK-39-5-1	0-6	A1	4.16	0.42	0.26	0.11	7.1	43.1	7.0	1.95	214.3
75-OK-39-5-2	6-17	B1	4.07	0.98	0.27	0.10	7.1	52.9	6.9	0.87	164.7
75-OK-39-5-3	17-28	B21t	6.70	1.06	0.16	0.09	10.3	62.4	7.2	0.88	213.3
75-OK-39-5-4	28-54	IIB2t	8.65	1.23	0.34	0.11	15.2	58.3	6.5	0.96	270.9
75-OK-39-5-5	54-80	IIB3	3.14	2.88	0.13	0.25	12.0	48.4	6.4	0.36	484.2
Shermore:[6]											
74-OK-39-3-1	0-9	A1	1.97	1.05	0.24	0.09	5.1	100.0	5.6	---	---
74-OK-39-3-2	9-19	B21t	3.32	2.23	0.13	0.09	8.8	62.8	5.4	---	---
74-OK-39-3-3	19-36	B22t	1.68	3.11	0.13	0.09	9.3	52.4	5.2	---	---
74-OK-39-3-4	36-50	Bx1	1.43	3.36	0.13	0.13	11.2	52.6	5.0	---	---
74-OK-39-3-5	50-60	Bx2	1.18	3.19	0.13	0.13	10.2	42.5	5.0	---	---
74-OK-39-3-6	60-72	Bx3	1.22	3.32	0.13	0.13	10.1	43.4	5.1	---	---
74-OK-39-3-7	72-86	C	1.09	3.28	0.13	0.13	8.5	44.9	5.1	---	---

See footnotes at end of table.

TABLE 19.--CHEMICAL ANALYSES OF SELECTED SOILS--Continued

Soil series and sample number	Depth	Horizon	Extractable bases (milliequivalents per 100 grams of soil)				Cation exchange capacity	Base saturation	Reaction 1:1 soil:water	Organic matter	Total phosphorus
			Ca	Mg	K	Na					
	In							Pct	pH	Pct	P/m
Sobol:[7]											
75-OK-39-2-1	0-9	A1	6.97	3.99	0.18	0.09	18.4	40.9	6.1	0.48	371.1
75-OK-39-2-2	9-15	B1t	4.91	7.27	0.15	0.57	25.4	37.9	5.2	0.23	283.8
75-OK-39-2-3	15-24	B21t	6.22	11.55	0.26	0.54	29.7	47.8	5.2	0.20	236.2
75-OK-39-2-4	24-40	B22t	7.22	12.22	0.28	0.67	24.2	59.7	6.4	0.21	371.1
75-OK-39-2-5	40-72	Cr	6.47	9.58	0.31	0.67	17.7	63.0	7.5	0.13	515.9

[1]This pedon is not typical for the series. It is a taxadjunct to the Counts series because the clay content decreases by slightly more than 20 percent of the maximum within a depth of 60 inches.

[2]The B3 horizon was subdivided for sampling purposes.

[3]This pedon is not typical for the series. It is a taxadjunct to the Neff series because the pH and the base saturation of the solum are slightly higher than allowed for the series.

[4]A IIB3&A2 horizon is between depths of 64 and 80 inches. In sampling, the IIB3 part and the IIA2 part were separated. This pedon is not typical for the series.

[5]This pedon is not typical for the series. It is a taxadjunct to the Sallisaw series because the clay content decreases by slightly more than 20 percent of the maximum within a depth of 60 inches and because the depth to coarse fragments is less than allowed for the series.

[6]This pedon is not typical for the series.

[7]This pedon is not typical for the series. It is a taxadjunct to the Sobol series because the surface layer is slightly darker than allowed for the series.

TABLE 20.--ENGINEERING INDEX TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name report number, horizon, and depth in inches	Classification		Grain-size distribution						Liquid limit	Plasticity index	Shrinkage		
			Percentage passing sieve--				Percentage smaller than--						
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.005 mm	.002 mm			Limit	Linear	Ratio
									Pct		Pct	Pct	Pct
Counts silt loam:[1] (S75OK-077-001)													
A1------- 0 to 7	A-4 (10)	ML	100	100	96	89	25	16	38	9	23.0	0.0	1.5
B21t-----14 to 27	A-7-6(45)	CH	100	100	99	95	64	56	66	41	11.0	0.0	2.0
B23t-----40 to 63	A-7-6(30)	CH	100	100	99	94	60	48	51	29	11.0	0.0	2.0
Rexor silt loam:[2] (S75OK-077-004)													
A1------- 0 to 10	A-4 (00)	ML	100	100	100	83	15	11	--	NP	0.0	0.0	0.0
B21t-----10 to 29	A-4 (06)	CL	100	100	100	83	27	23	27	10	14.0	0.0	1.8
B23t-----48 to 64	A-4 (00)	ML	100	100	100	66	18	15	--	NP	0.0	0.0	0.0
Sallisaw loam:[3] (S75OK-077-005)													
A1------- 0 to 6	A-4 (00)	ML	100	100	96	80	10	8	--	NP	0.0	0.0	0.0
B21t-----17 to 28	A-6 (04)	CL	100	84	79	60	24	22	27	12	10.0	0.0	1.9
IIB22t---28 to 54	A-2-6(00)	GC	40	28	20	16	9	8	37	18	13.0	0.0	1.9
Sobol sandy loam:[4] (S75OK-077-002)													
A1------- 0 to 9	A-4 (07)	ML	100	100	88	75	23	17	34	10	16.0	0.0	1.7
B21t-----15 to 24	A-7-6(31)	CH	100	100	94	91	56	46	58	30	14.0	0.0	1.8
B22t-----24 to 40	A-7-6(29)	CH	100	100	97	95	60	45	53	27	13.0	0.0	1.9

[1]Counts silt loam:
400 ft. N. and 150 ft. W. of the SE. corner of sec. 12, T. 5 N., R. 18 E. This pedon is a taxadjunct to the series because the clay content decreases by slightly more than 20 percent within the prescribed depths for Paleudalfs.

[2]Rexor silt loam:
1,900 ft. E. and 1,550 ft. S. of the NW. corner of sec. 7, T. 5 N., R. 18 E. This pedon is a taxadjunct to the series because the liquid limit and the plasticity index of the A1 and B23t horizons and the liquid limit of the B21t horizon are slightly lower than allowed for the series. Also, the B23t horizon has a Unified classification of ML.

[3]Sallisaw loam:
2,100 ft. E. and 400 ft. N. of the SW. corner of sec. 33, T. 6 N., R. 18 E. This pedon is a taxadjunct to the series because the clay content decreases by slightly more than 20 percent within the prescribed depths and the depth to coarse fragments is less than allowed for the series.

[4]Sobol sandy loam:
2,200 ft. W. and 150 ft. S. of the NE. corner of sec 17, T. 5 N., R. 18 E. This pedon is a taxadjunct to the series because the surface layer is slightly darker than allowed for the series.

TABLE 21.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Bengal	Clayey, mixed, thermic Typic Hapludults
Bernow Variant	Fine-loamy, siliceous, thermic Glossic Paleudalfs
Bigfork	Loamy-skeletal, siliceous, thermic Typic Hapludults
Carnasaw	Clayey, mixed, thermic Typic Hapludults
Ceda	Loamy-skeletal, siliceous, nonacid, thermic Typic Udifluvents
Clebit	Loamy-skeletal, siliceous, thermic Lithic Dystrochrepts
Clodine Variant	Loamy-skeletal, siliceous, thermic Typic Ochraqualfs
Counts	Fine, mixed, thermic Albaquic Paleudalfs
Cupco	Fine-silty, siliceous, thermic Aeric Ochraqualfs
Dela	Coarse-loamy, siliceous, nonacid, thermic Typic Udifluvents
Denman	Fine-loamy over clayey, siliceous, thermic Typic Hapludults
Freestone Variant	Fine-loamy, siliceous, thermic Glossaquic Paleudalfs
Kanima	Loamy-skeletal, mixed, nonacid, thermic Udalfic Arents
Kenn	Fine-loamy, siliceous, thermic Ultic Hapludalfs
Neff	Fine-silty, siliceous, thermic Aquultic Hapludalfs
Octavia	Fine-loamy, siliceous, thermic Typic Paleudults
Panama	Loamy-skeletal, siliceous, thermic Typic Paleudults
Pickens Variant	Loamy-skeletal, siliceous, thermic, shallow Typic Dystrochrepts
Pirum	Fine-loamy, siliceous, thermic Typic Hapludults
Rexor	Fine-silty, siliceous, thermic Ultic Hapludalfs
Sallisaw	Fine-loamy, siliceous, thermic Typic Paleudalfs
Shermore	Fine-loamy, siliceous, thermic Typic Fragiudalfs
Sobol	Fine, mixed, thermic Aquic Hapludalfs
Stigler	Fine, mixed, thermic Aquic Paleudalfs
Tamaha	Fine, mixed, thermic Aquic Paleudalfs
Tuskahoma	Clayey, mixed, thermic, shallow Albaquic Hapludalfs
Wilburton	Loamy-skeletal, siliceous, thermic Ultic Hapludalfs
Wilburton Variant	Fine-loamy, siliceous, thermic Ultic Hapludalfs
Wing*	Fine, mixed, thermic Aquic Natrustalfs
Wister	Fine, mixed, thermic Albaquic Hapludalfs
Woodson Variant	Fine, mixed, thermic Aquic Argiudolls
Yanush	Loamy-skeletal, siliceous, thermic Typic Paleudalfs

* The soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

* U.S. GOVERNMENT PRINTING OFFICE: 1981 - 348-517/1069

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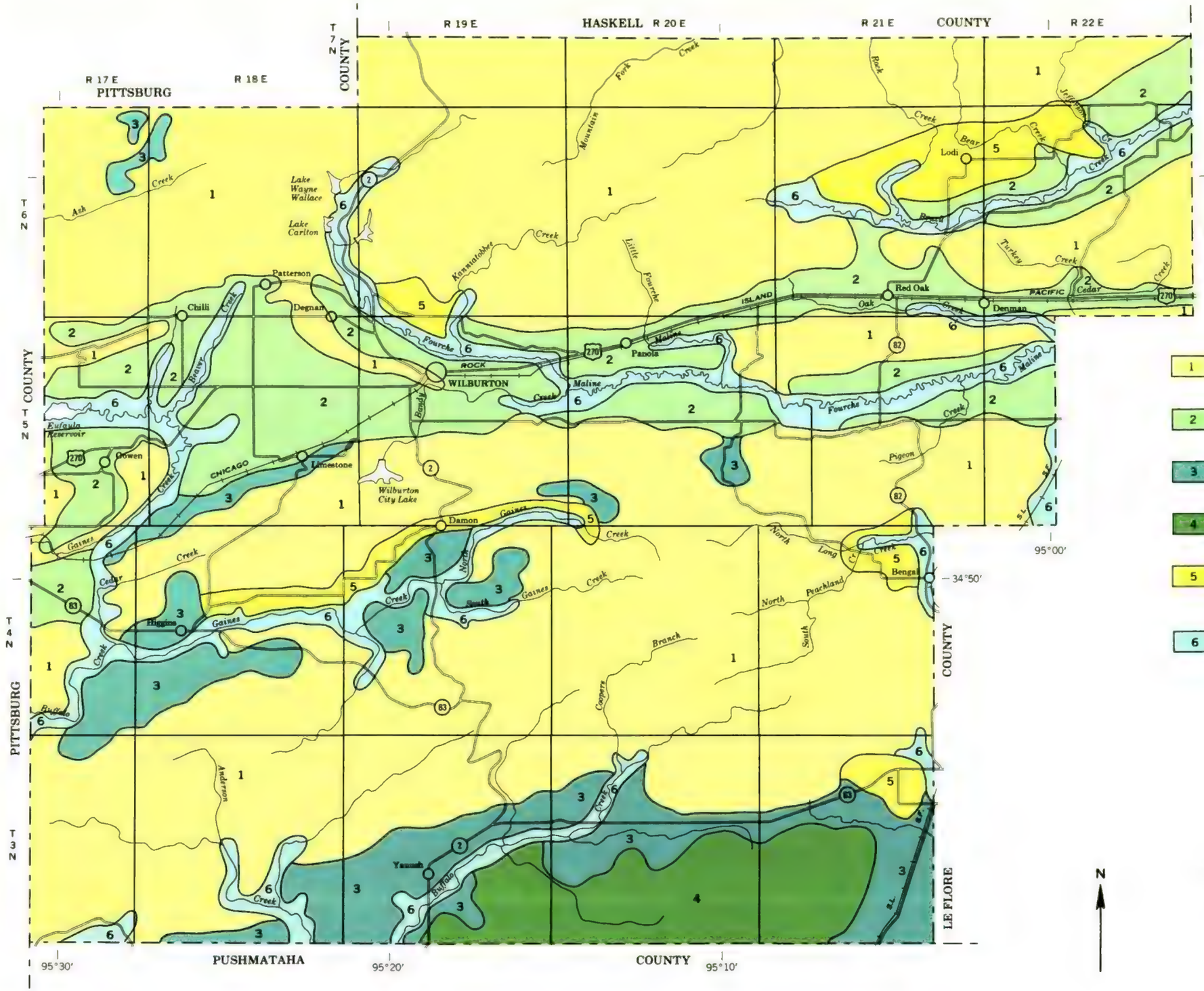


LEGEND

1 CARNASAW-CLEBIT-DENMAN: Deep and shallow, gently sloping to steep, stony, well drained loamy soils; on mountains and ridges

2 STIGLER-COUNTS-TAMAHA: Deep, dominantly nearly level to gently sloping, moderately well drained loamy soils; on broad valley floors

3 SOBOL-TUSKAHOMA-WISTER: Shallow to deep, very gently sloping to moderately steep, moderately well drained loamy soils; mainly on low ridges in broad valleys

4 YANUSH-BIGFORK: Deep and moderately deep, very gently sloping to steep, cherty and stony, well drained loamy soils; on ridges and outwash fans

5 SHERMORE-WILBURTON-SALLISAW: Deep, very gently sloping to moderately steep, moderately well drained and well drained loamy soils; on foot slopes, outwash fans, and terraces

6 NEFF-REXOR-CUPCO: Deep, nearly level and very gently sloping, moderately well drained to somewhat poorly drained loamy soils; on flood plains

Compiled 1981

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
OKLAHOMA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

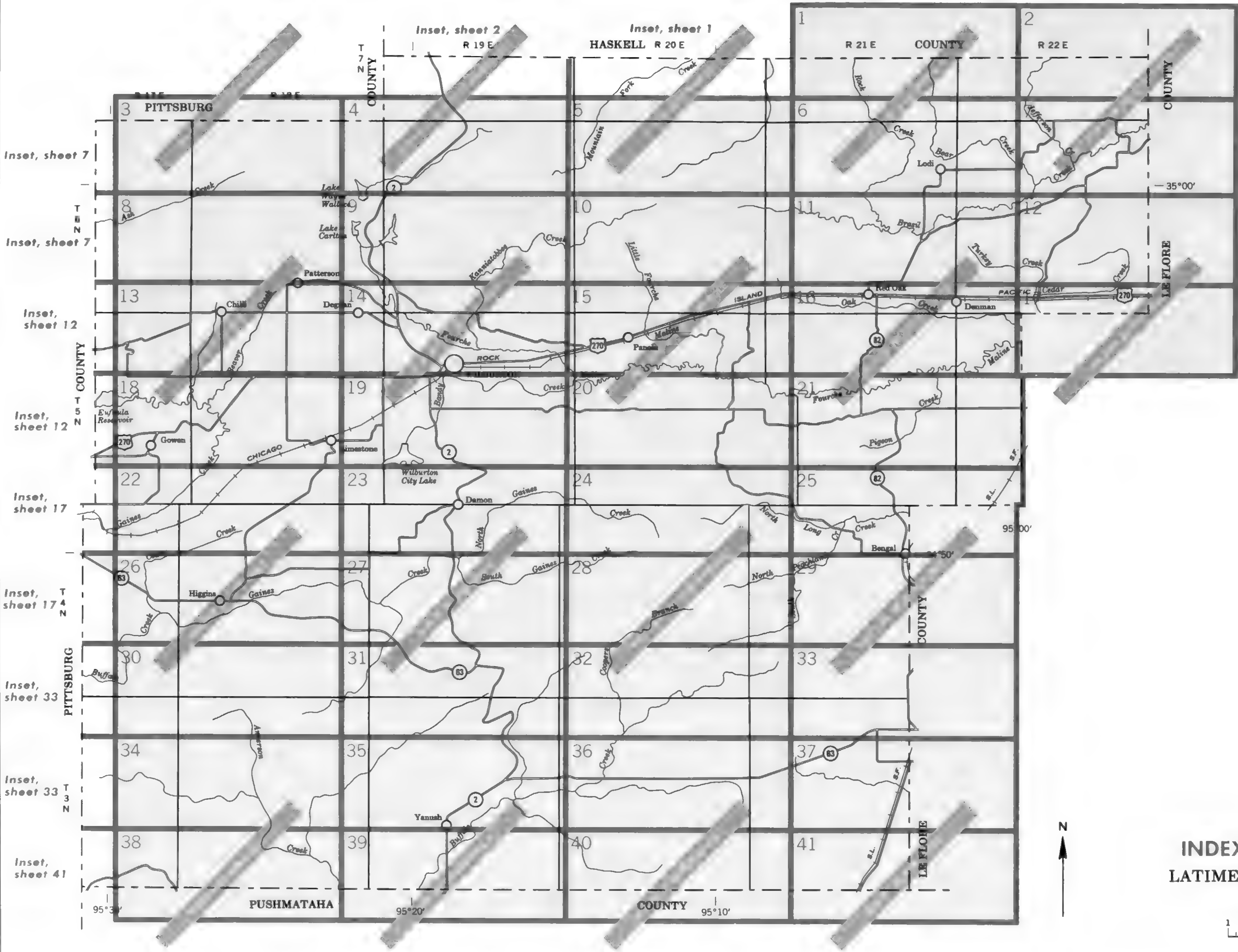
LATIMER COUNTY, OKLAHOMA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



INDEX TO MAP SHEETS

LATIMER COUNTY, OKLAHOMA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km

SOIL LEGEND

The publication symbols are numeric and the map unit names are in alphabetical order. Soil names followed by the superscript 1/ are broadly defined units. The composition of these units is more variable than that of the other units in the survey area, but has been controlled well enough to be interpreted for the expected use of the soils. Soils without a slope designation in the name are those that occur on nearly level landscapes.

SYMBOL	NAME
1	Bengal-Clebit complex, 3 to 8 percent slopes
2	Bengal-Denman association, moderately steep 1/
3	Bigfork-Yanush association, steep 1/
4	Carnasaw-Clebit association, moderately steep 1/
5	Carnasaw-Clebit-Pickens Variant association, steep 1/
6	Carnasaw-Clebit-Rock outcrop complex, 3 to 8 percent slopes
7	Carnasaw-Pirum complex, 3 to 8 percent slopes
8	Carnasaw-Pirum-Clebit association, strongly sloping 1/
9	Ceda cherty silt loam, occasionally flooded
10	Ceda cherty silt loam, frequently flooded
11	Ceda-Rubble land complex
12	Clebit-Pirum complex, 5 to 12 percent slopes
13	Clebit-Pirum-Rock outcrop complex, 15 to 40 percent slopes
14	Clodine Variant-Wilburton Variant complex, 0 to 3 percent slopes
15	Counts silt loam, 0 to 1 percent slopes
16	Counts silt loam, 1 to 3 percent slopes
17	Counts-Rexor complex, 0 to 12 percent slopes
18	Counts-Wing complex, 1 to 3 percent slopes
19	Cupco silt loam
20	Dela fine sandy loam
21	Denman-Carnasaw association, steep 1/
22	Freestone Variant-Bernow Variant complex, 0 to 2 percent slopes
23	Kamma shaly silty clay loam, 30 to 50 percent slopes
24	Kenn-Ceda complex, 0 to 2 percent slopes
25	Neff silt loam
26	Neff and Rexor silt loams 1/
27	Octavia-Carnasaw-Clebit association, cool, steep 1/
28	Pirum fine sandy loam, 1 to 3 percent slopes
29	Pirum fine sandy loam, 3 to 5 percent slopes
30	Pirum-Carnasaw Panama association, steep 1/
31	Rexor silt loam
32	Sallisaw loam, 1 to 3 percent slopes
33	Shermore fine sandy loam, 1 to 3 percent slopes
34	Shermore fine sandy loam, 3 to 5 percent slopes
35	Shermore fine sandy loam, 2 to 5 percent slopes, eroded
36	Sobol silt loam, 2 to 5 percent slopes
37	Sobol-Rock outcrop complex, 5 to 20 percent slopes
38	Stigler silt loam, 0 to 1 percent slopes
39	Stigler silt loam, 1 to 3 percent slopes
40	Tamaha silt loam, 1 to 3 percent slopes
41	Tamaha silt loam, 3 to 5 percent slopes
42	Tuskahoma-Sobol complex, 3 to 8 percent slopes
43	Tuskahoma-Sobol complex, 8 to 20 percent slopes
44	Wilburton cobbly loam, 2 to 8 percent slopes
45	Wilburton cobbly loam, 8 to 20 percent slopes
46	Wister silt loam, 1 to 3 percent slopes
47	Woodson Variant silty clay loam, 0 to 3 percent slopes
48	Yanush cherty silt loam, 1 to 3 percent slopes
49	Yanush cherty silt loam, 3 to 8 percent slopes
50	Yanush cherty silt loam, 8 to 20 percent slopes
51	Yanush-Sobol complex, 5 to 20 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate
- Federal
- State
- County, farm or ranch

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label)
- Located object (label)
- Tank (label)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

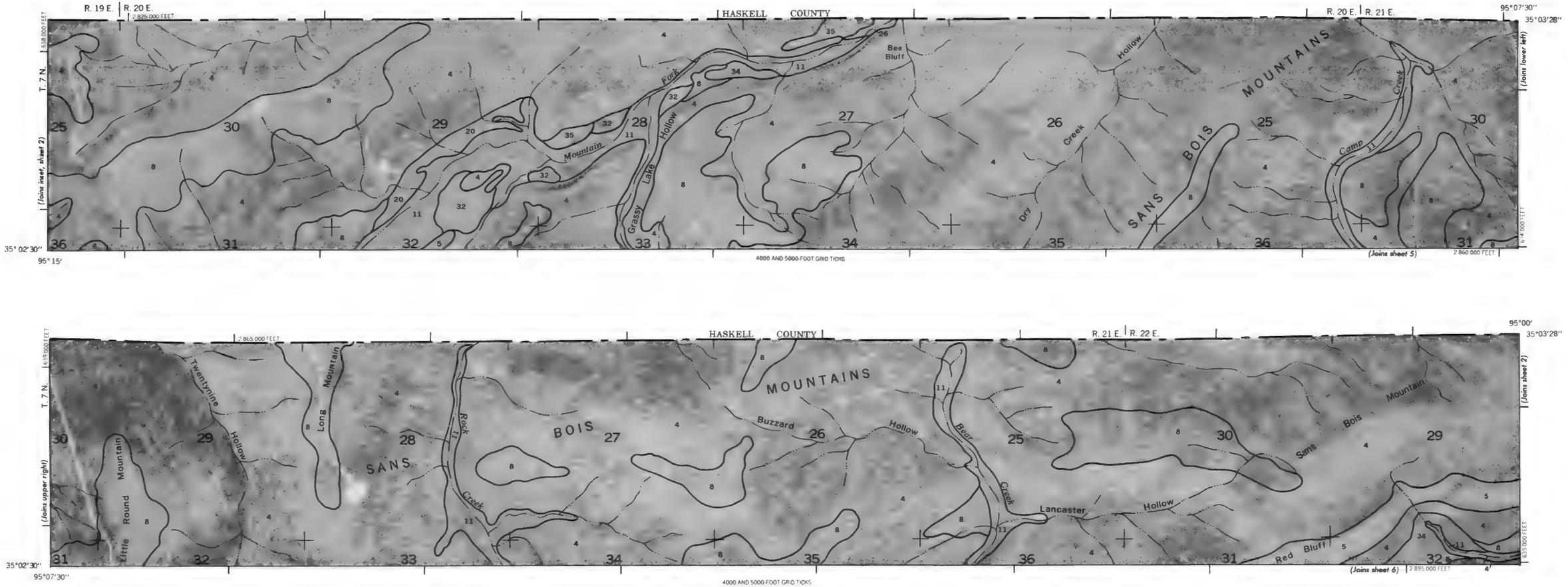
DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

MISCELLANEOUS

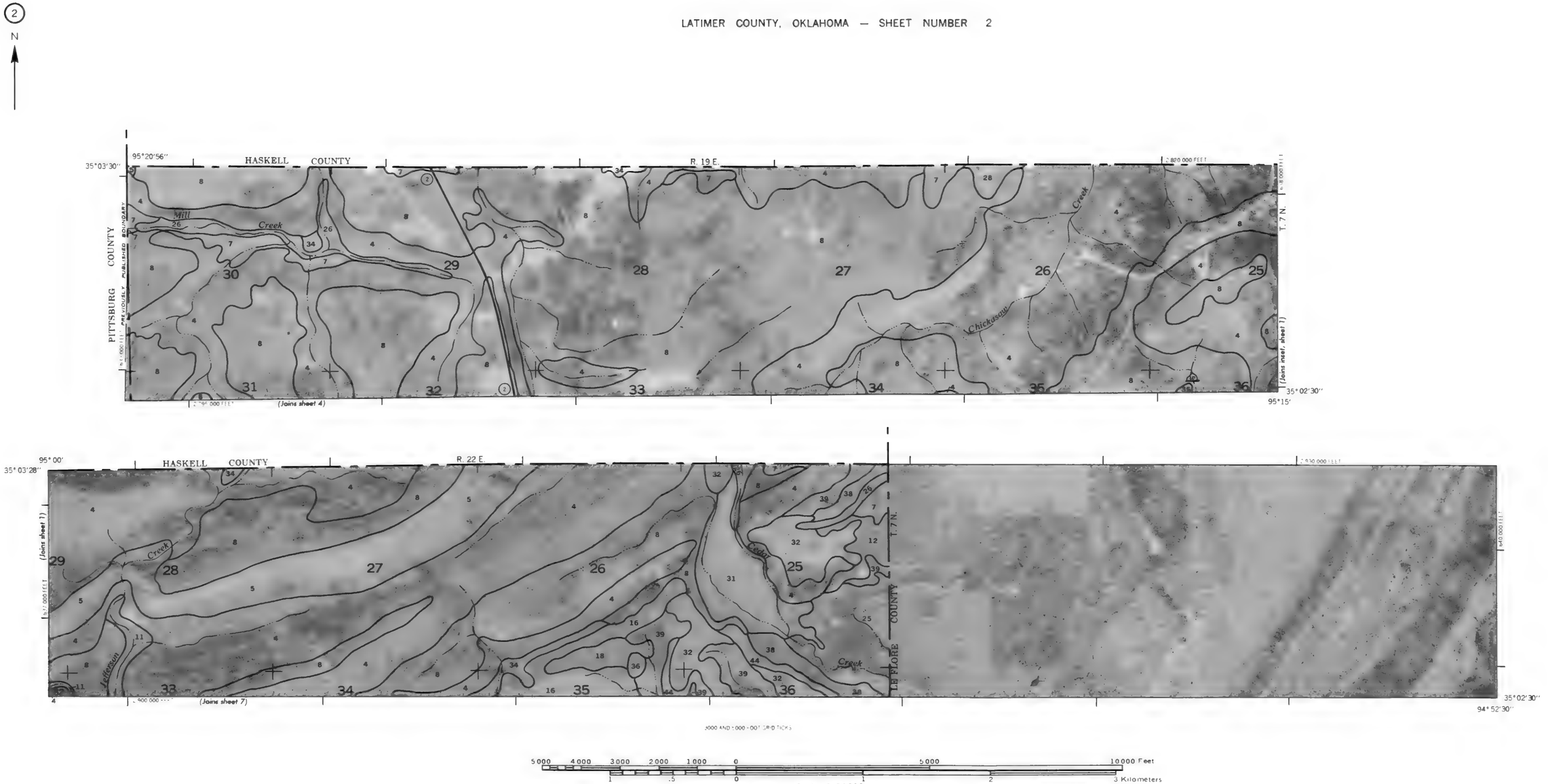
- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

LATIMER COUNTY, OKLAHOMA — SHEET NUMBER 1



LATIMER COUNTY, OKLAHOMA NO. 1

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.



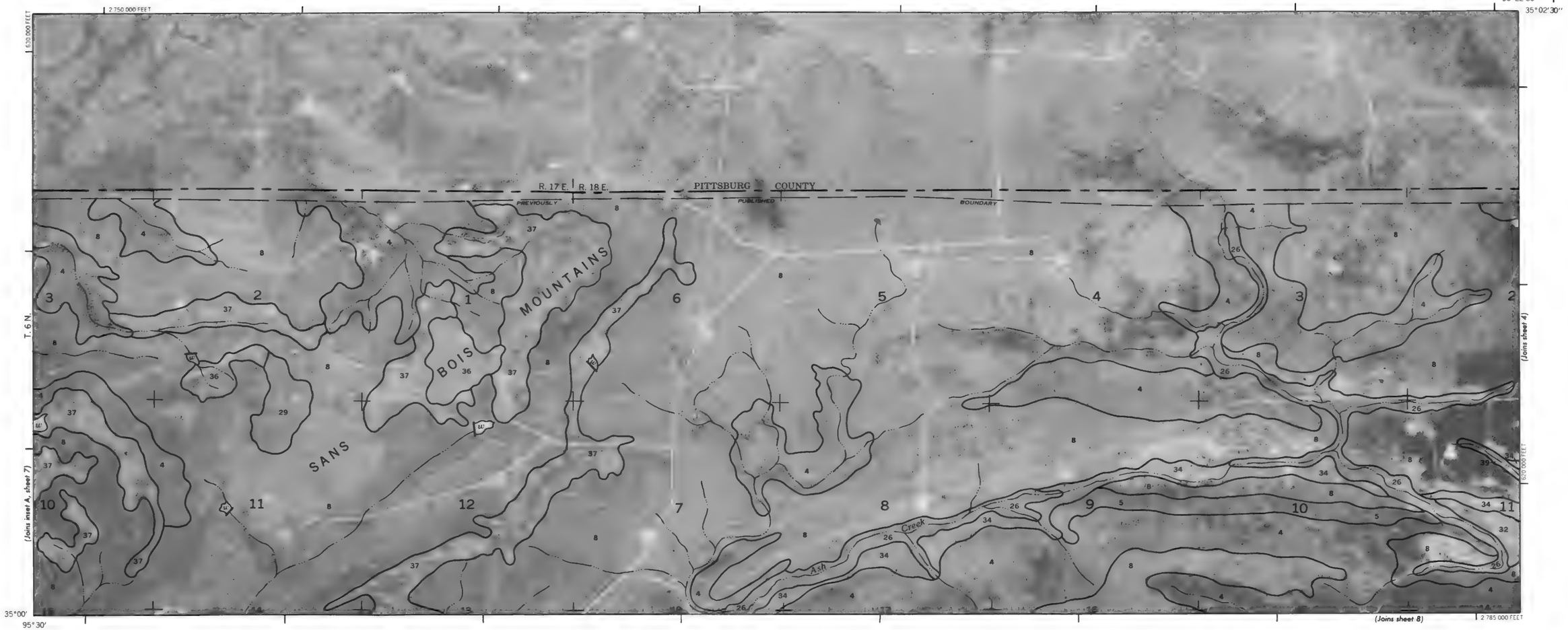
This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 2

LATIMER COUNTY, OKLAHOMA — SHEET NUMBER 3

3

N



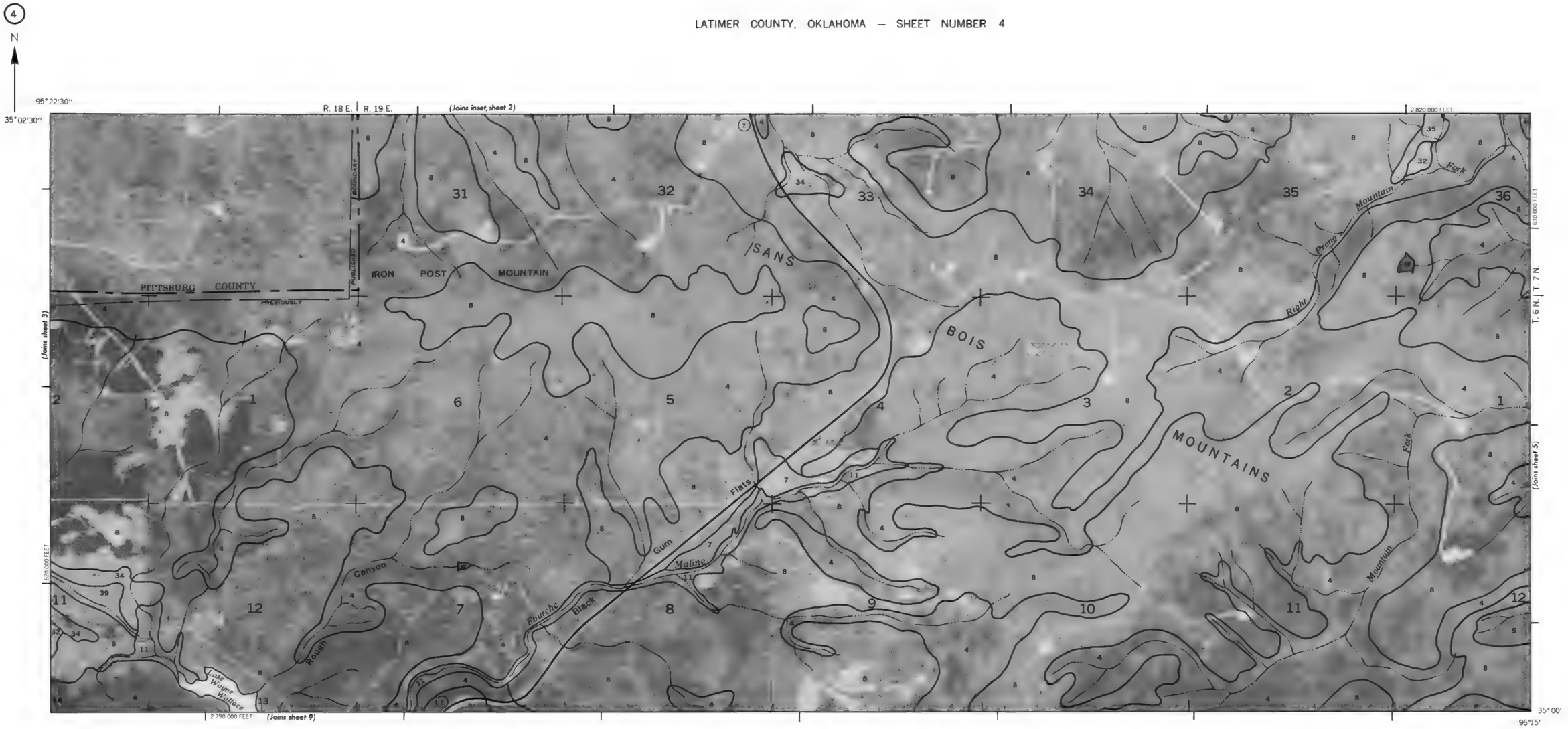
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

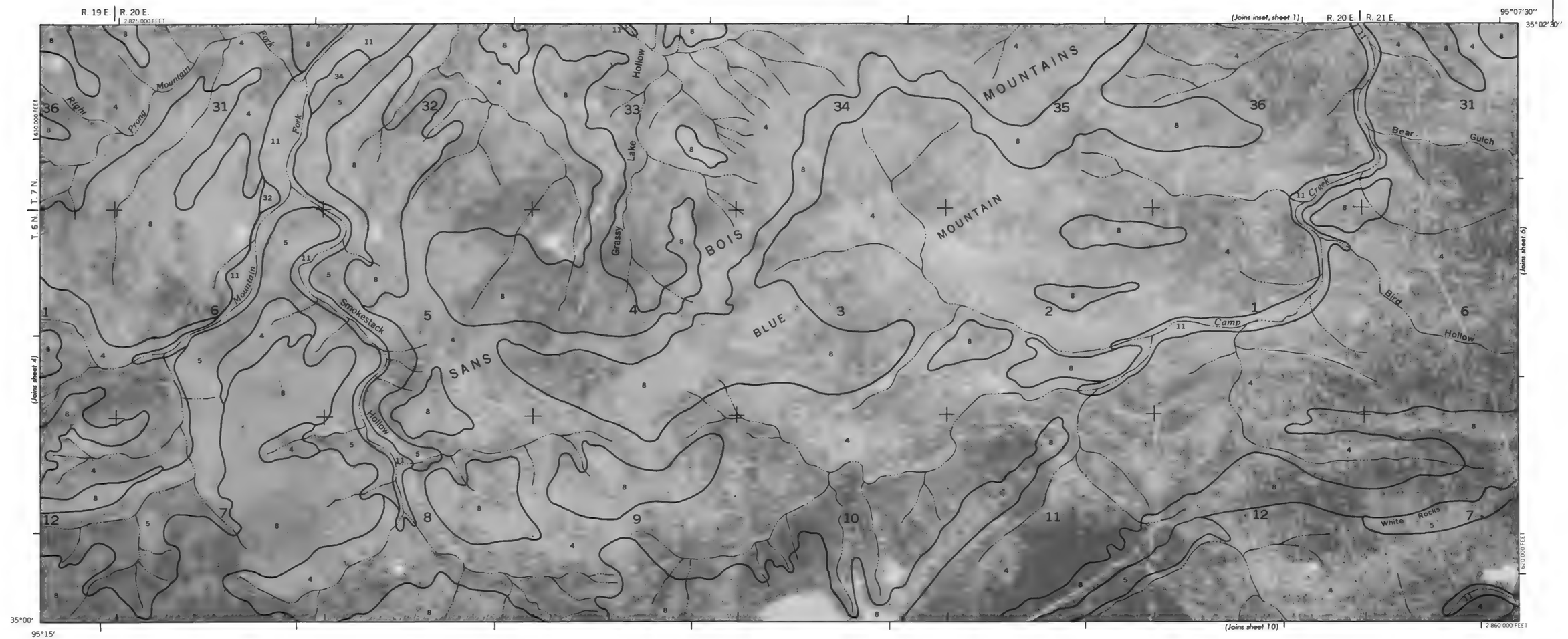
LATIMER COUNTY, OKLAHOMA NO. 3

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.



This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 4



5000 4000 3000 2000 1000 0 5000 10000 Feet

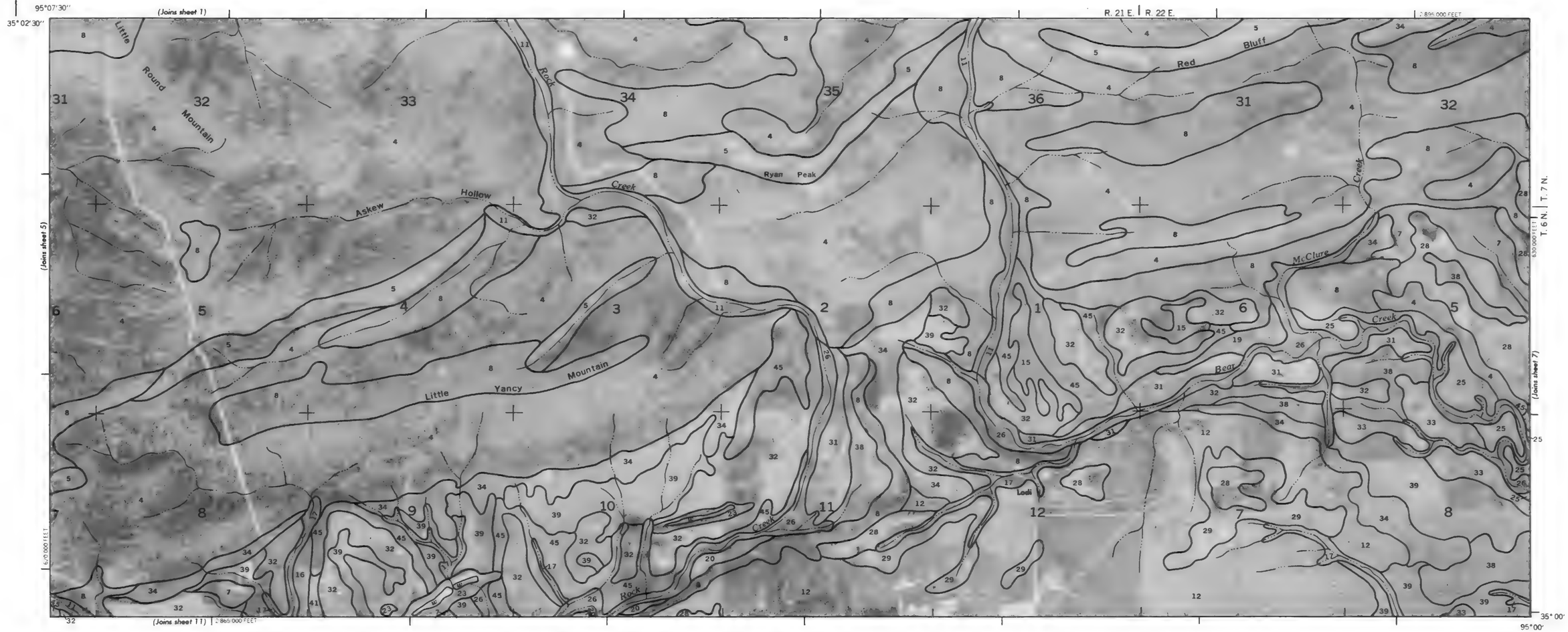
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

LATIMER COUNTY, OKLAHOMA NO. 5

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA — SHEET NUMBER 6



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

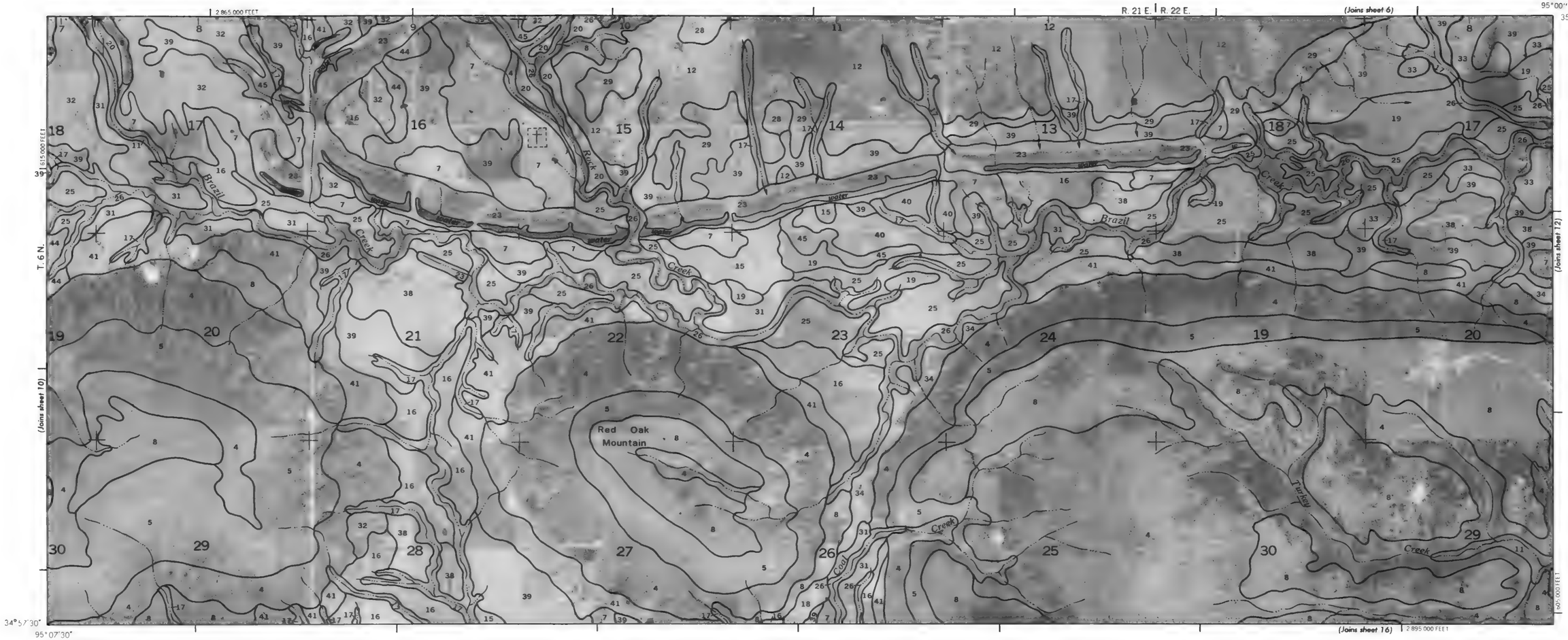
Scale - 1:24000

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 6

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

N



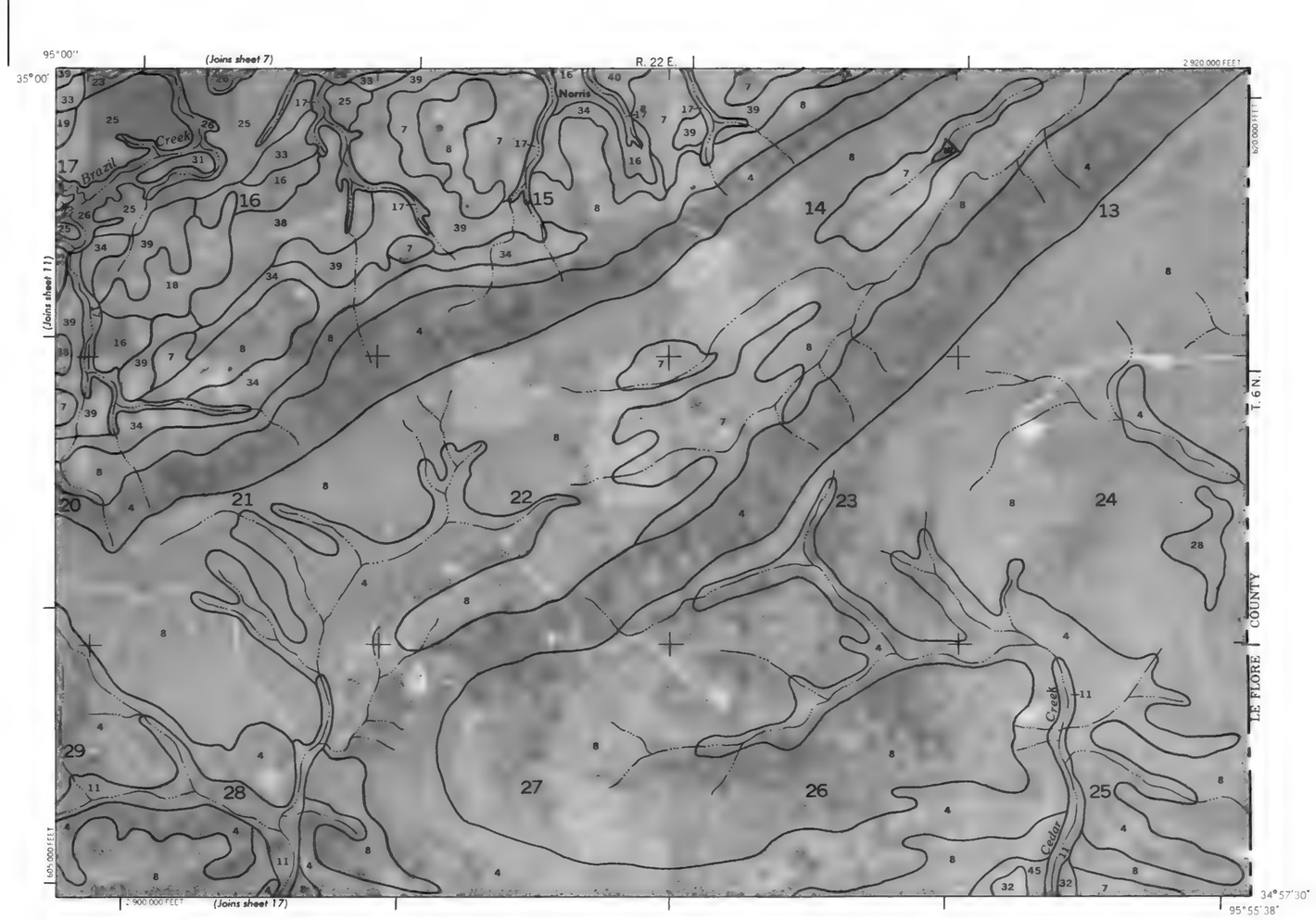
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

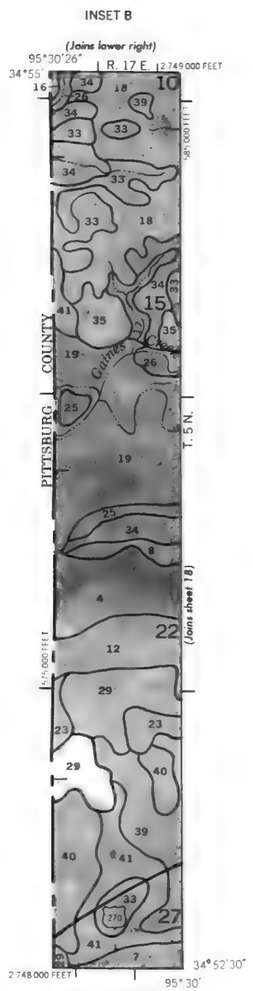
Scale - 1:24000

LATIMER COUNTY, OKLAHOMA NO. 11

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

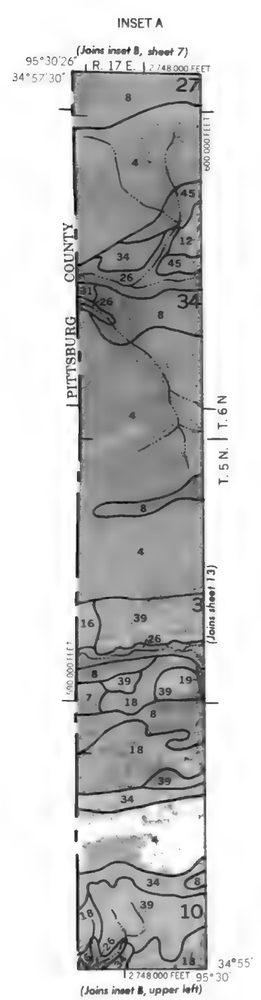


INSET B



1000 AND 5000 FOOT GRID TICKS

INSET A



0 AND 5000 FOOT GRID TICKS

5000 4000 3000 2000 1000 0 5000 10000 Feet

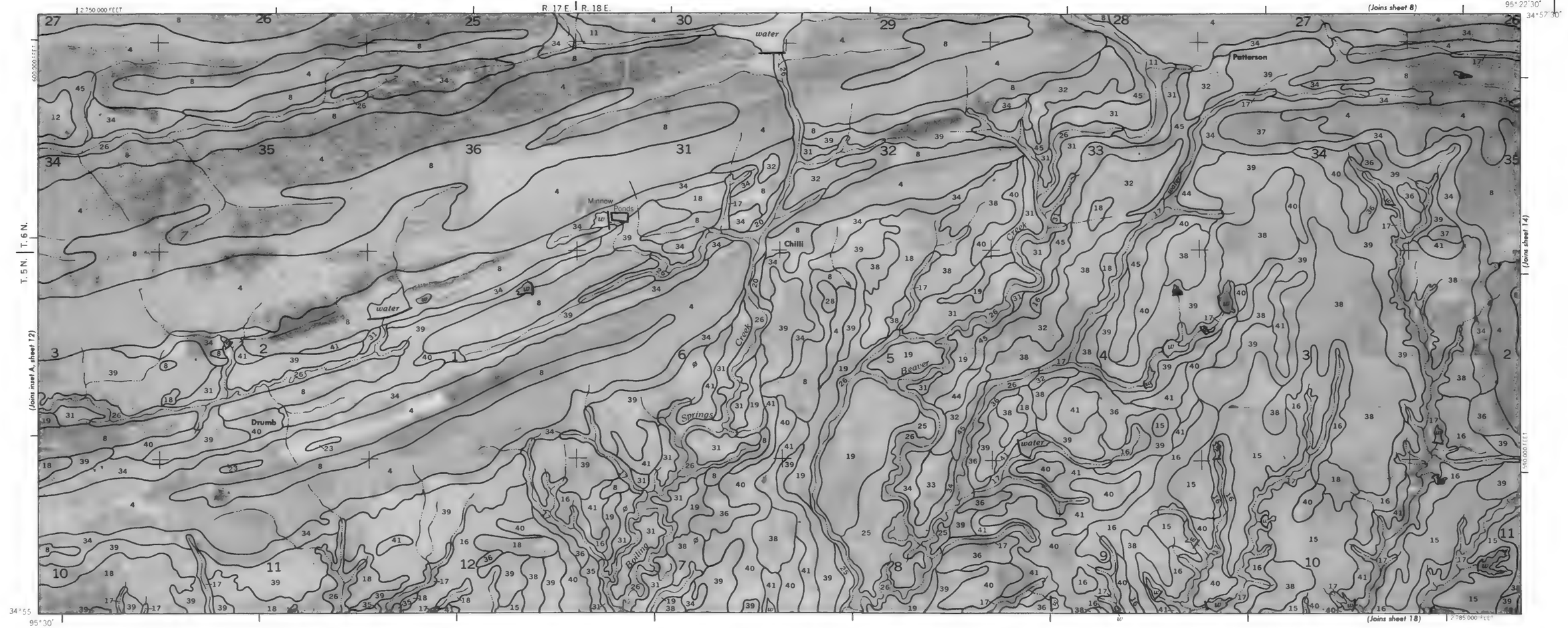
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 13

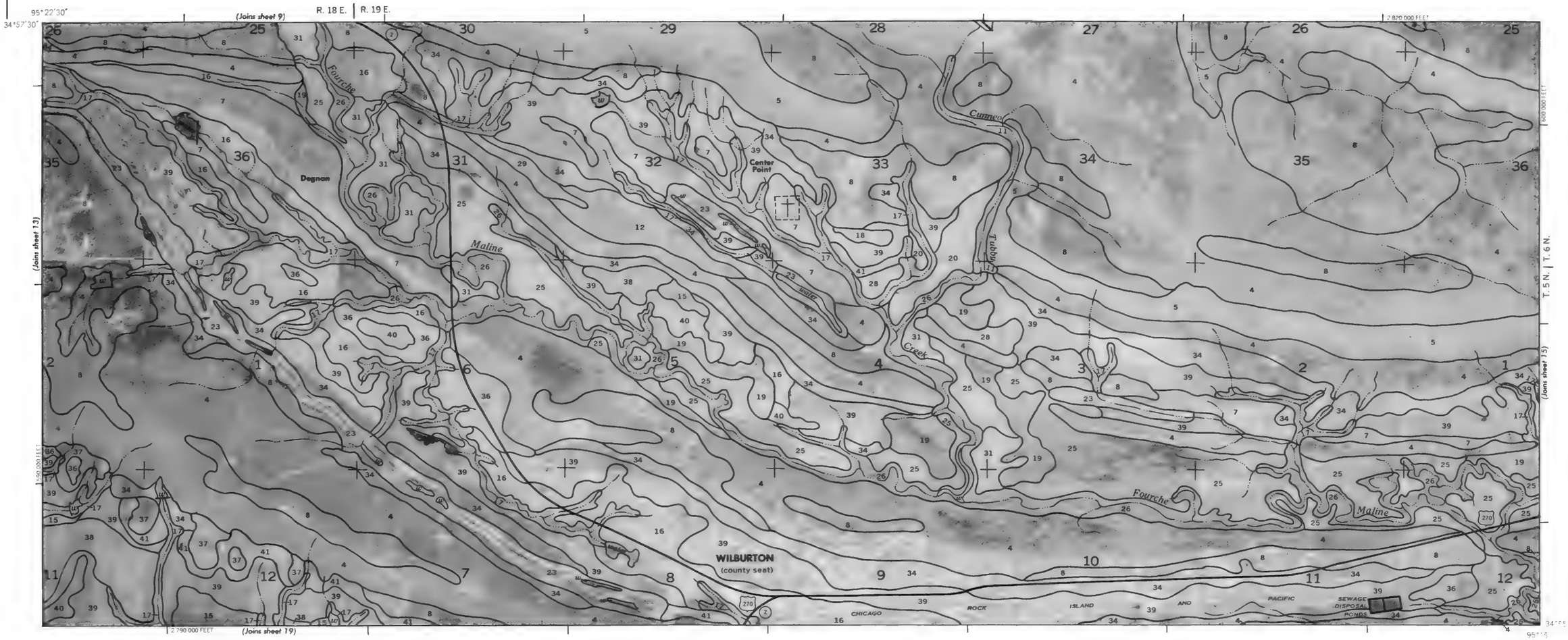
This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 14

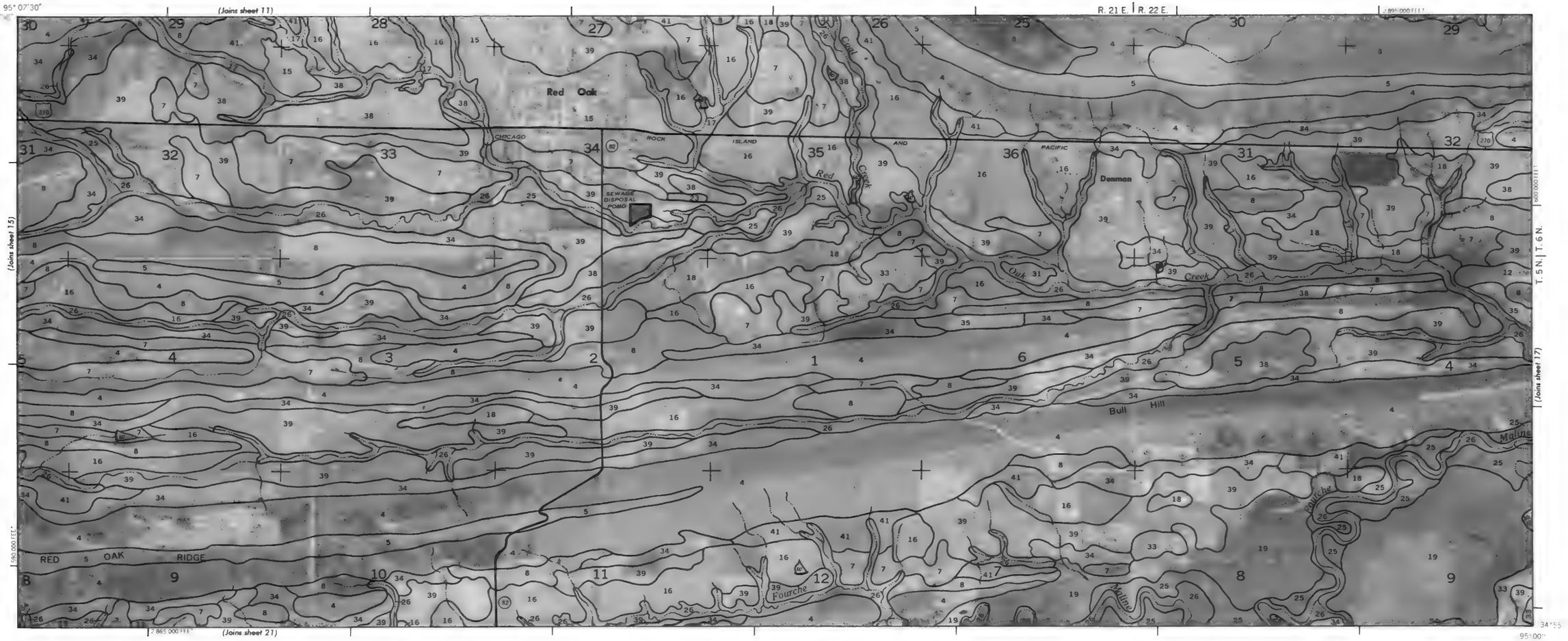
N

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

LATIMER COUNTY, OKLAHOMA — SHEET NUMBER 16



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

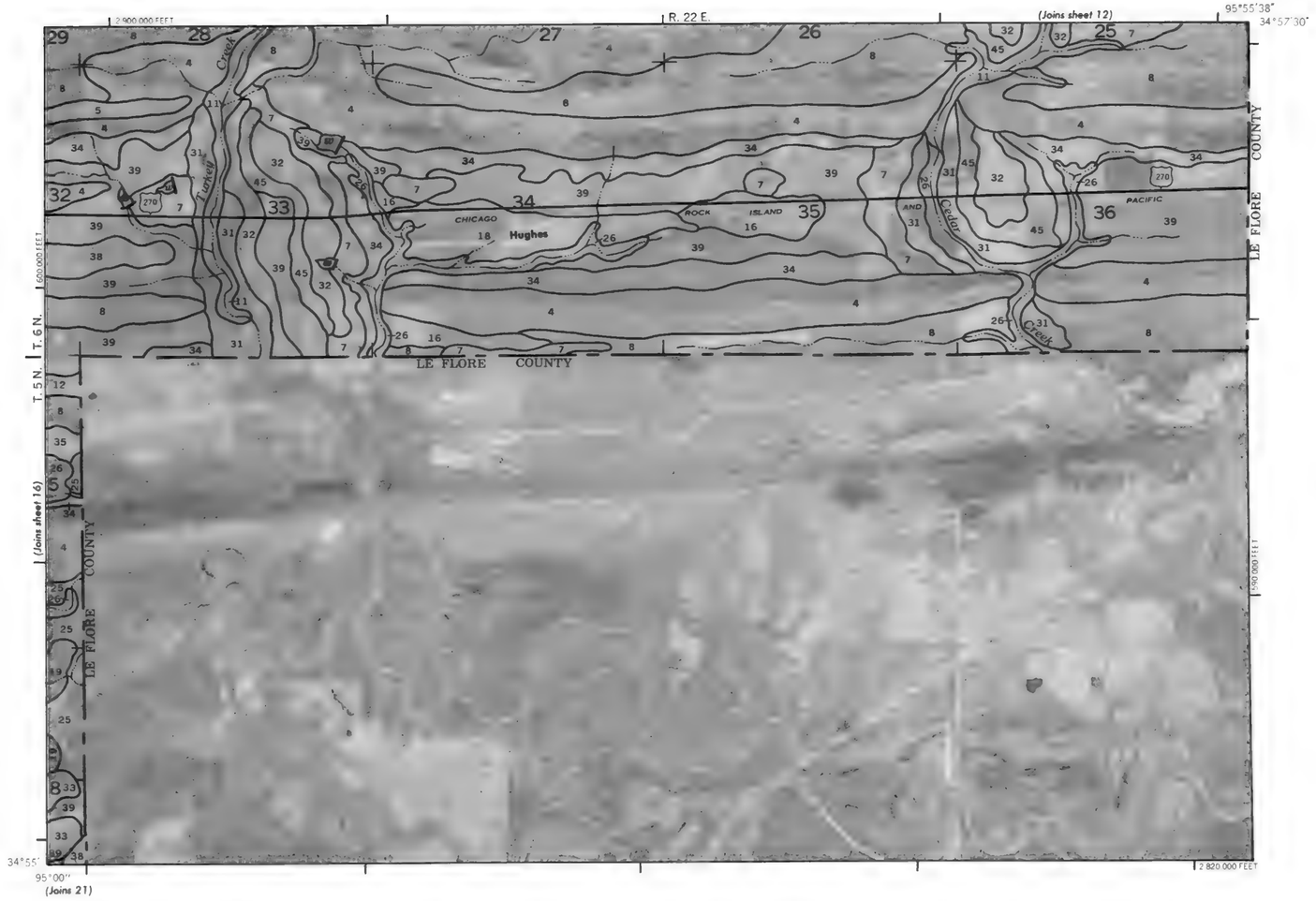
This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 16

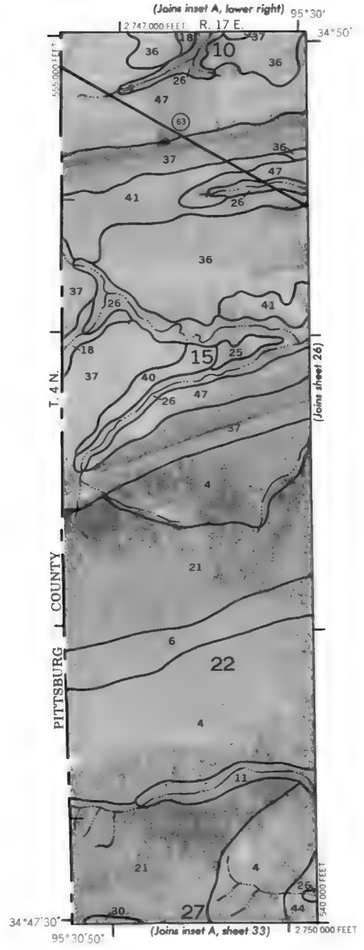
N

LATIMER COUNTY, OKLAHOMA NO. 17

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

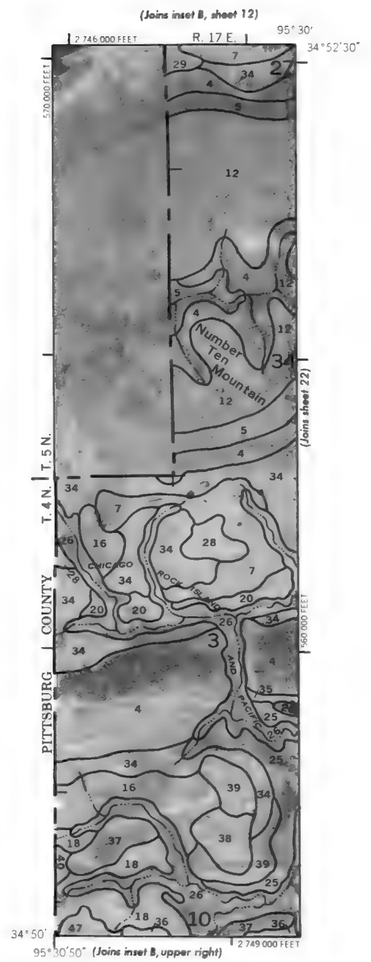


INSET B



3000 AND 5000-FOOT GRID TICKS

INSET A



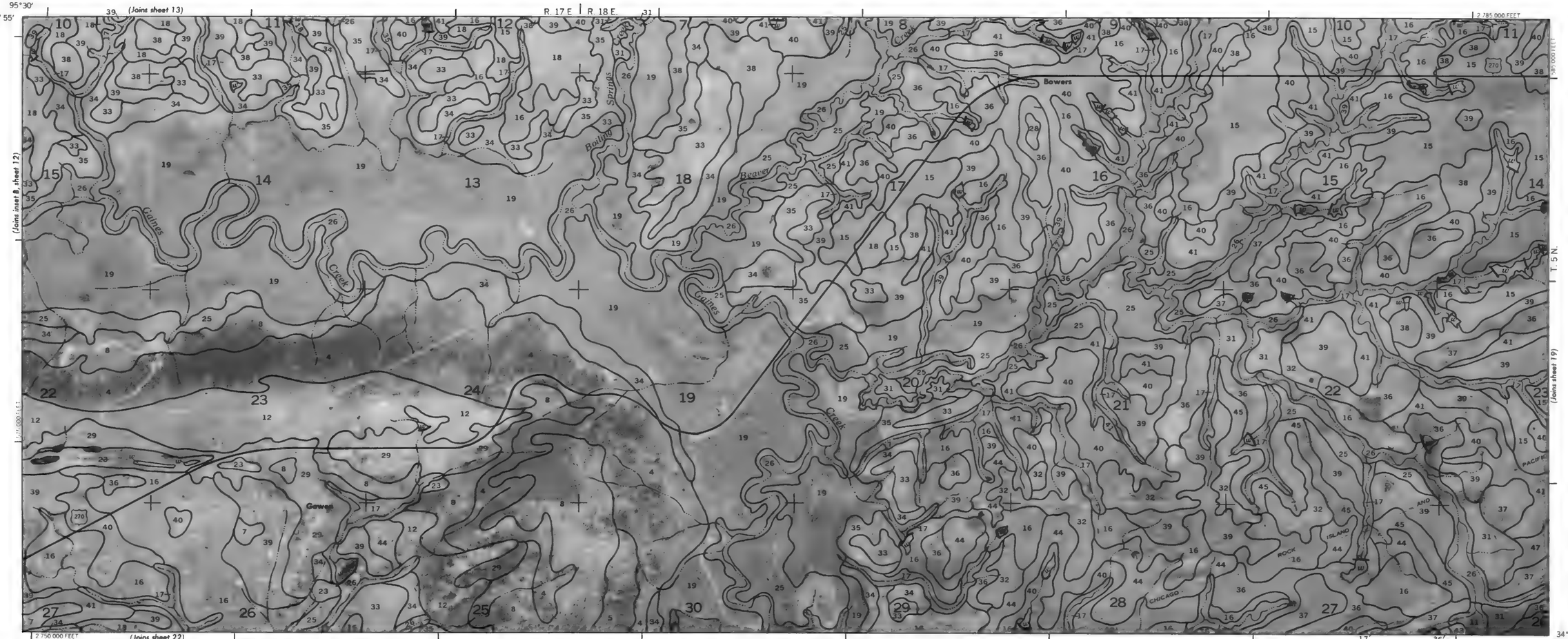
3000 AND 5000-FOOT GRID TICKS

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

LATIMER COUNTY, OKLAHOMA — SHEET NUMBER 18



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

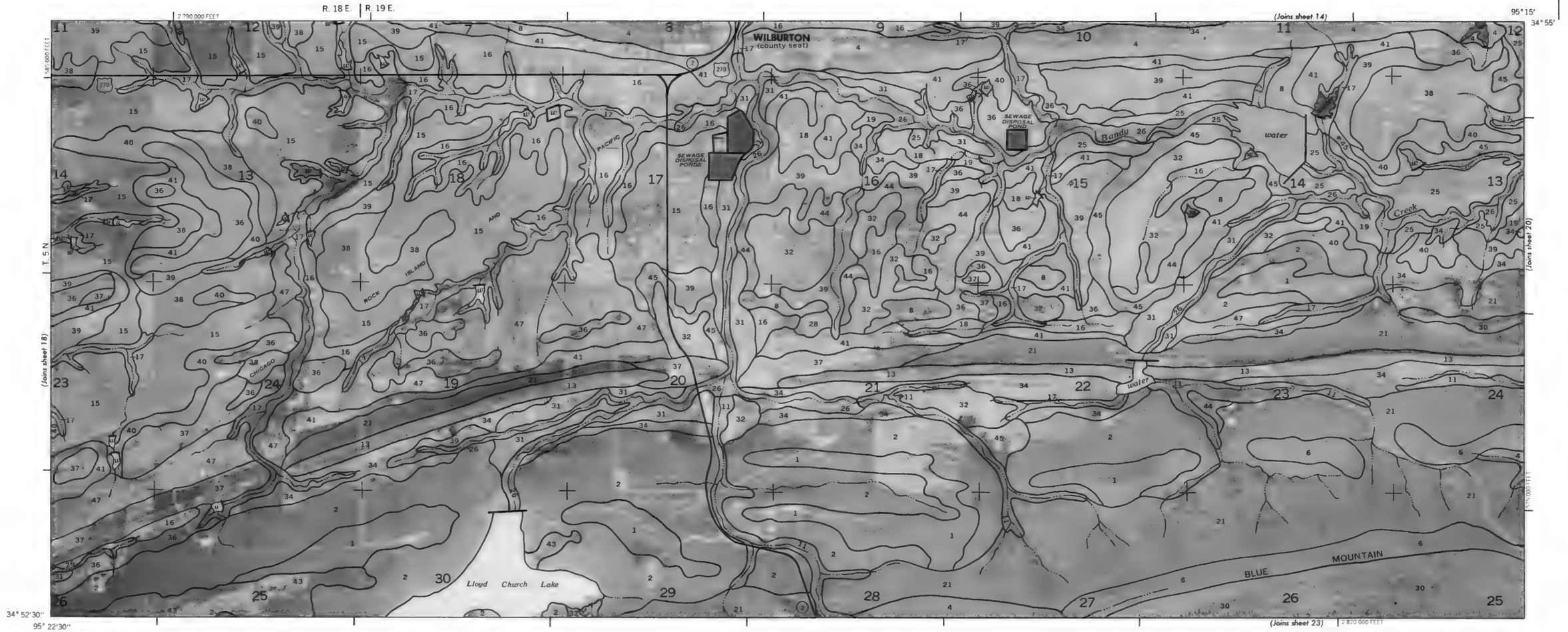
This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 18

N

LATIMER COUNTY, OKLAHOMA NO. 19

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

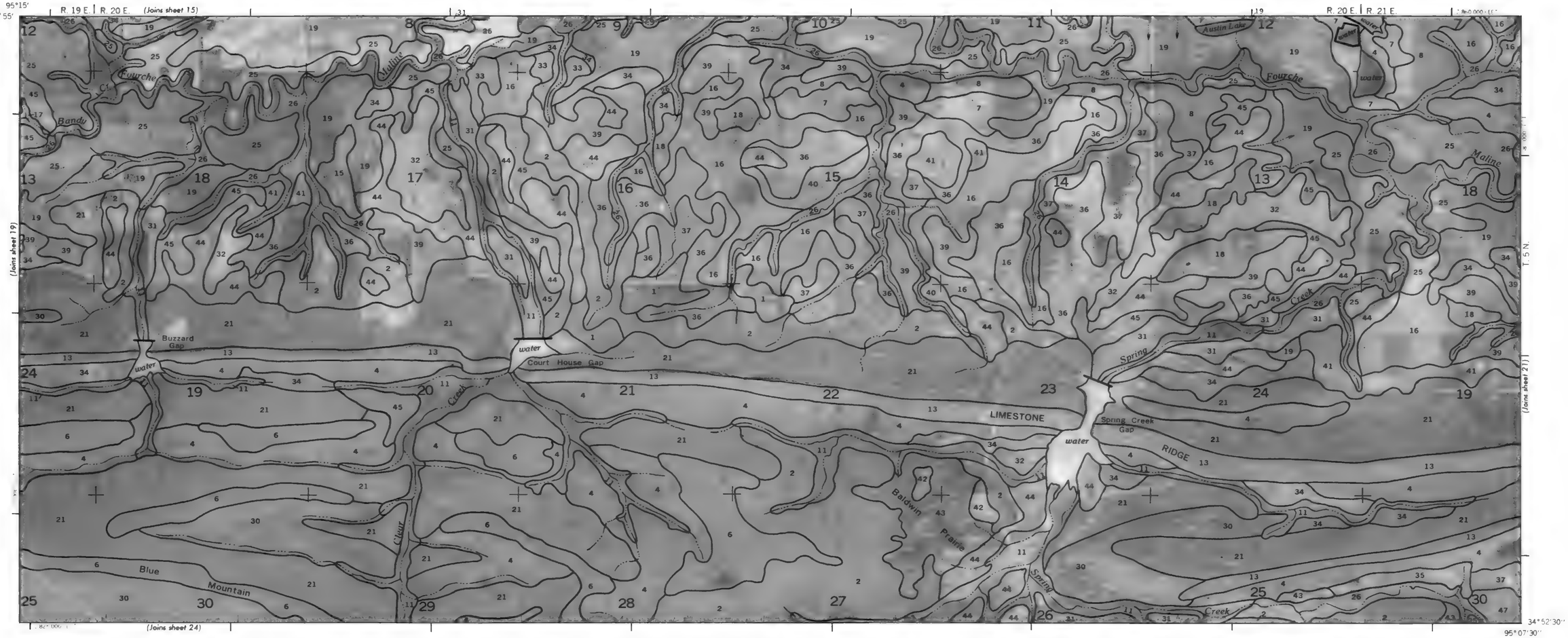


5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

LATIMER COUNTY, OKLAHOMA — SHEET NUMBER 20



5000 4000 3000 2000 1000 0 5000 10000 Feet

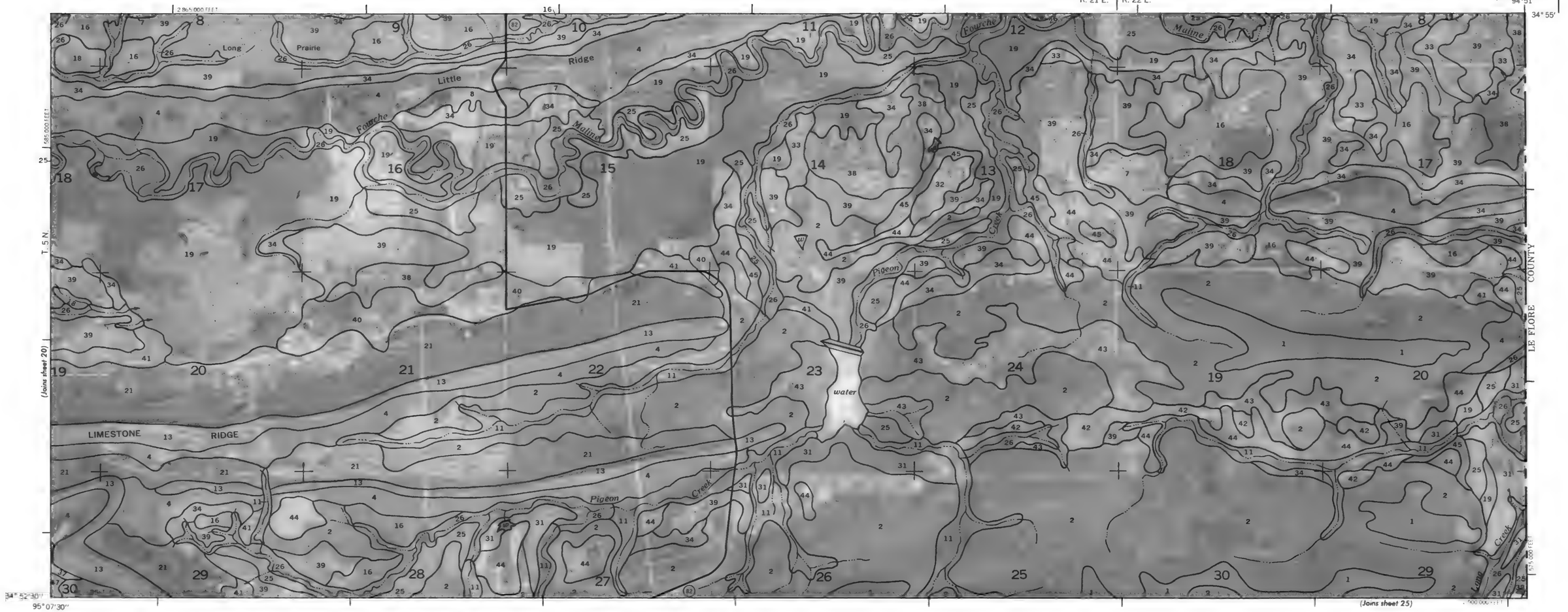
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 20

N



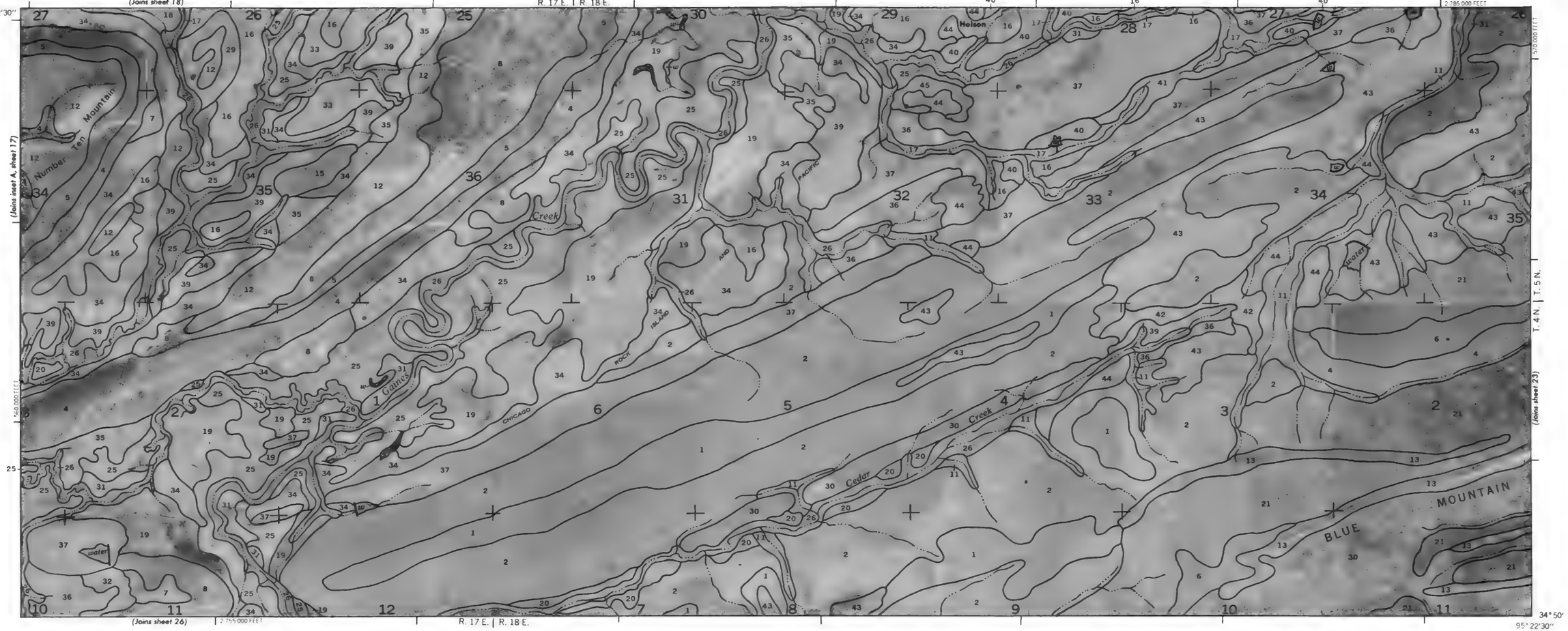
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

LATIMER COUNTY, OKLAHOMA NO. 21

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

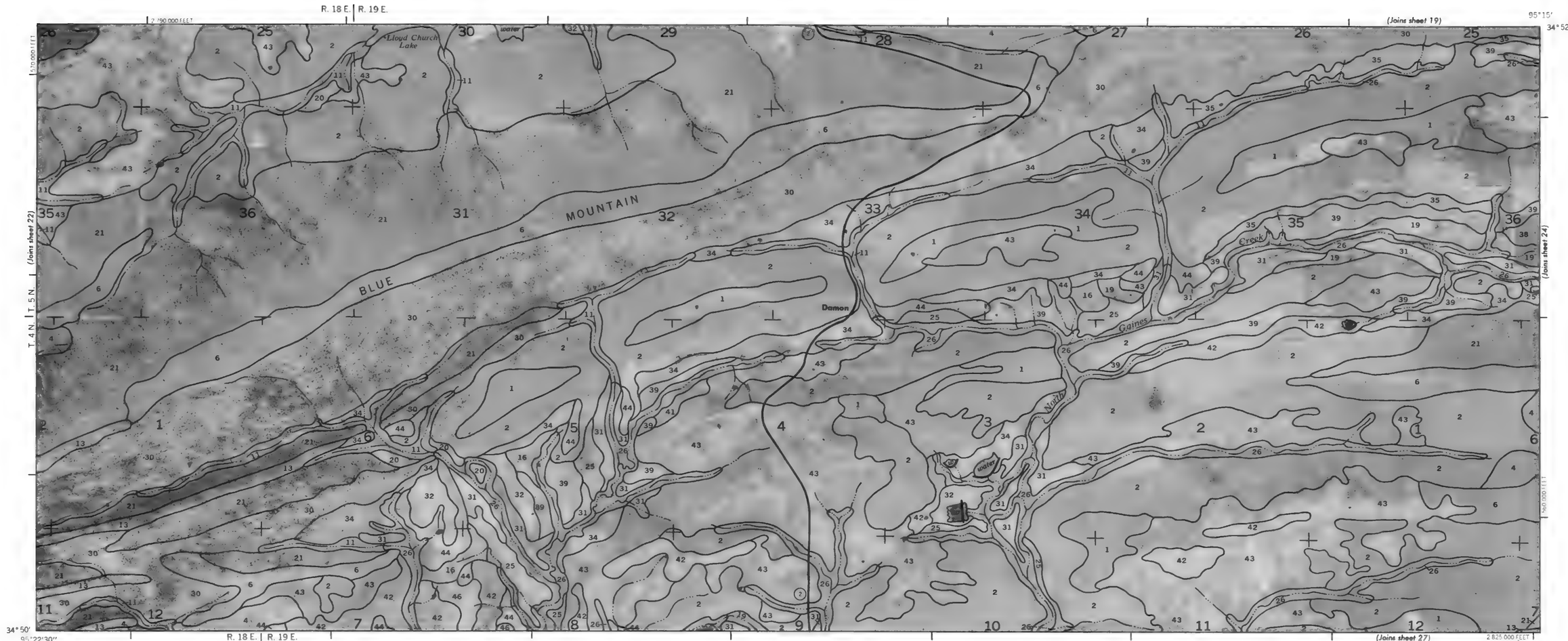
Scale - 1:24000

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

N

LATIMER COUNTY, OKLAHOMA NO. 23

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

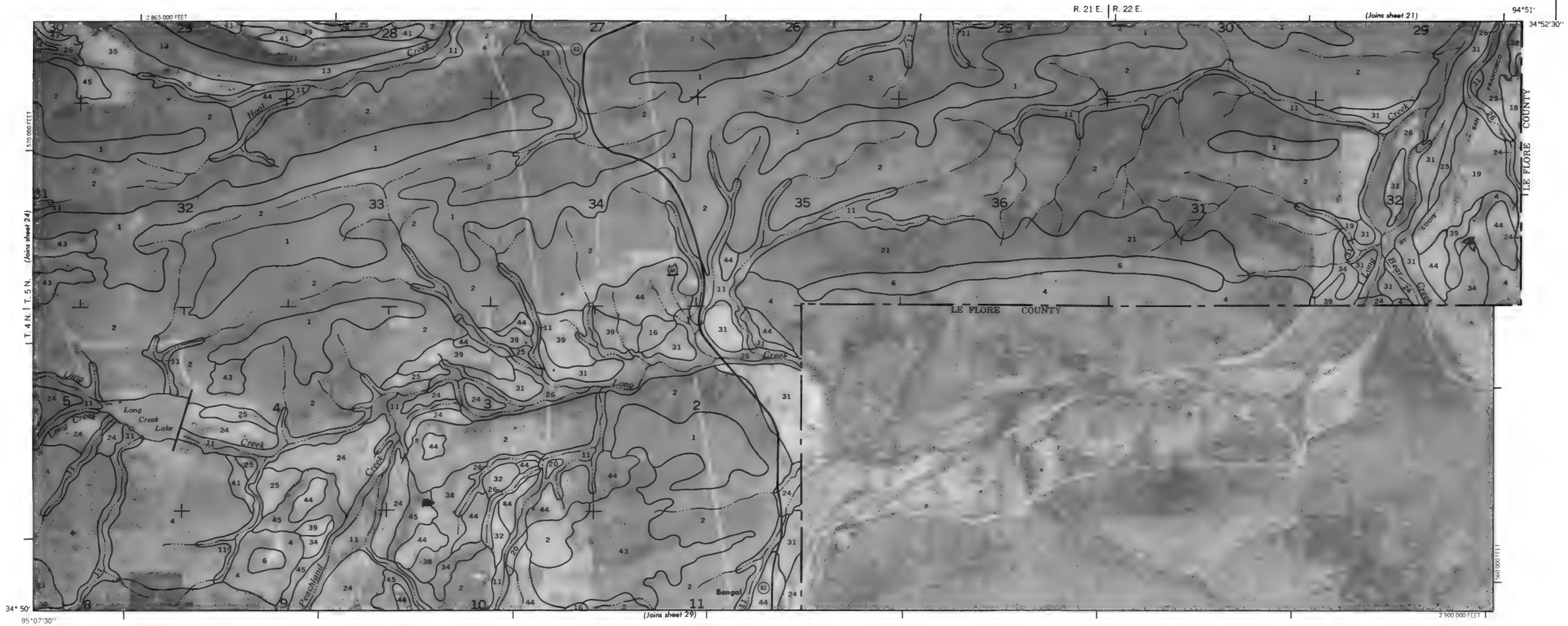
This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies in 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 24

LATIMER COUNTY, OKLAHOMA — SHEET NUMBER 25

25

N



5000 4000 3000 2000 1000 0 5000 10000 Feet

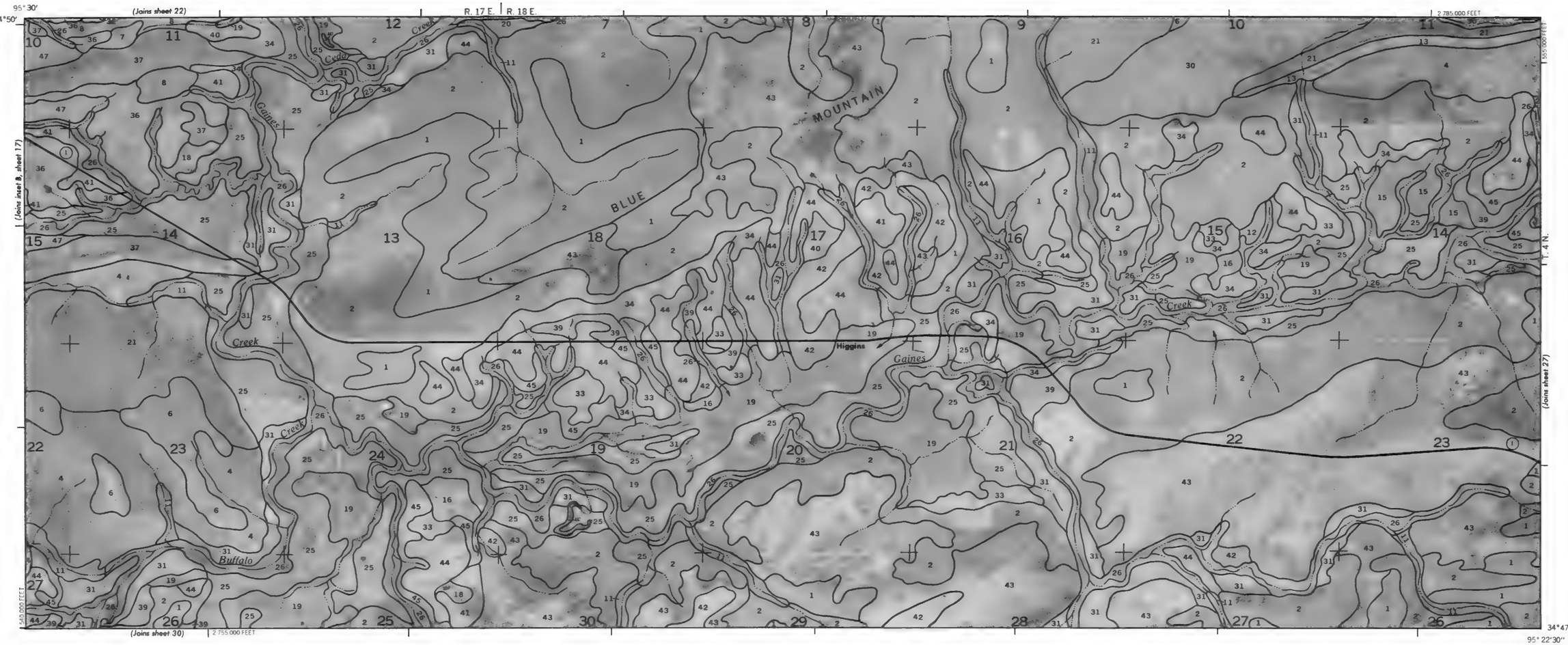
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

LATIMER COUNTY, OKLAHOMA NO. 25

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA — SHEET NUMBER 26



5000 4000 3000 2000 1000 0 5000 10000 Feet

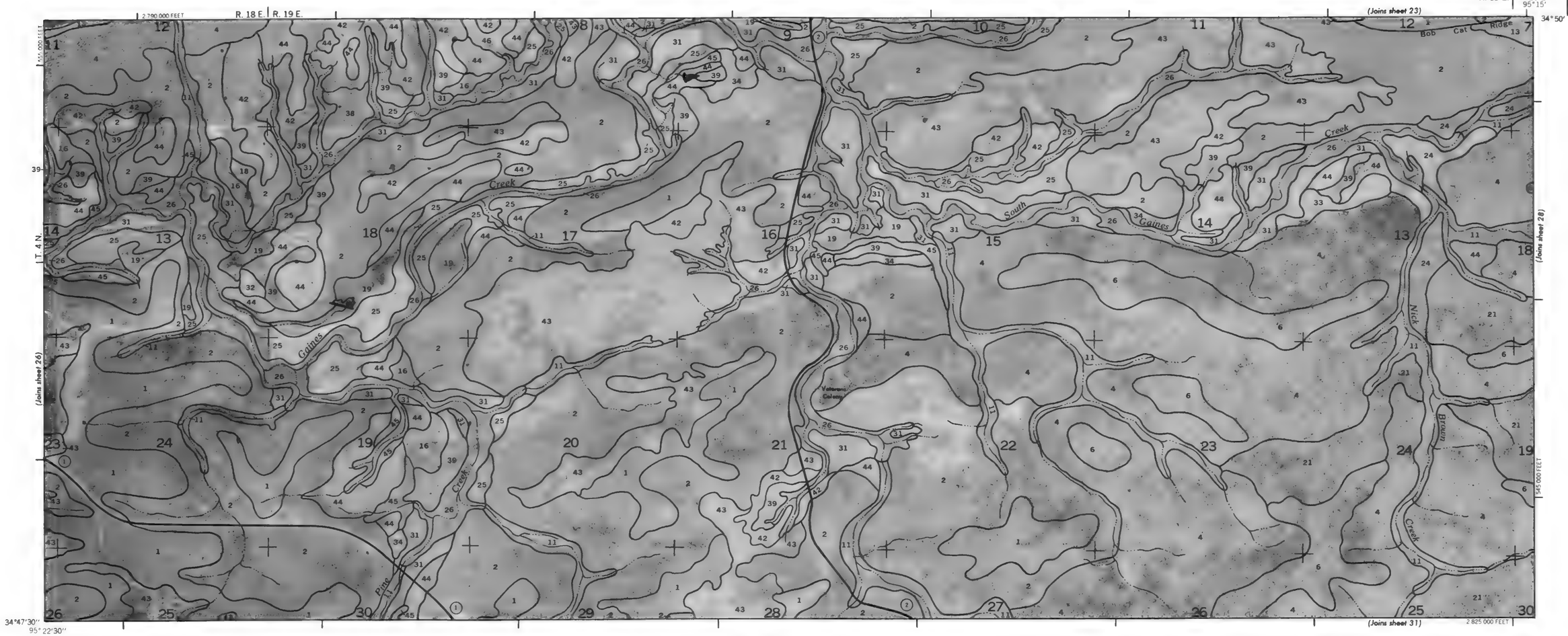
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 26

N



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

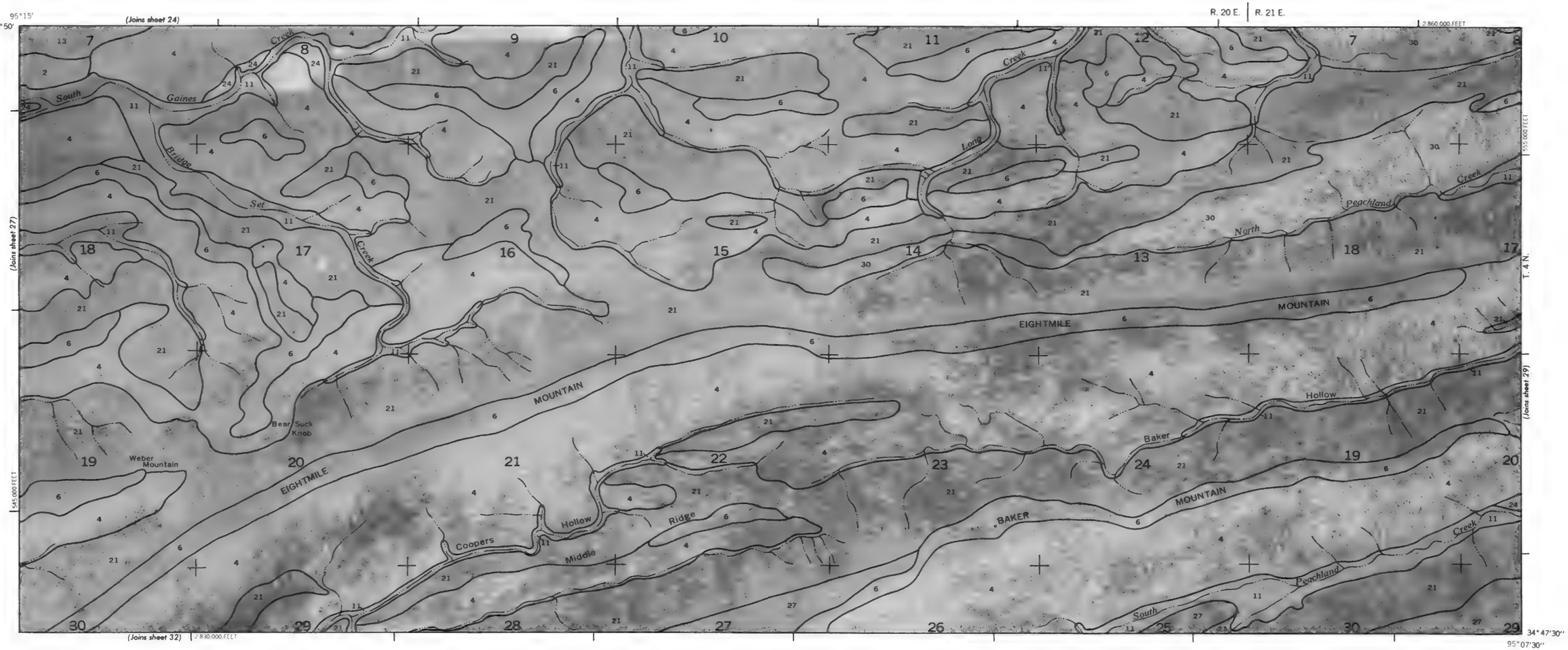
Scale - 1:24000

LATIMER COUNTY, OKLAHOMA NO. 27

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

N

LATIMER COUNTY, OKLAHOMA — SHEET NUMBER 28



5000 4000 3000 2000 1000 0 5000 10000 Feet

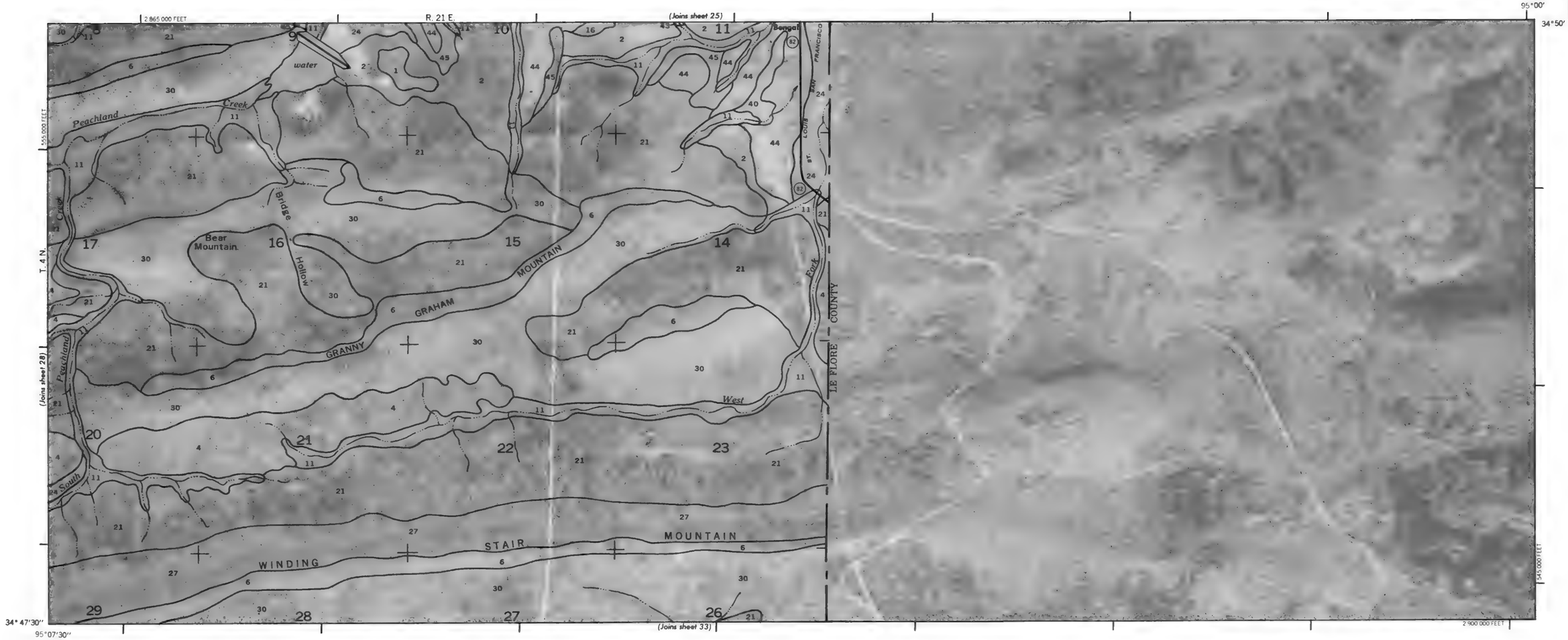
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 28

N



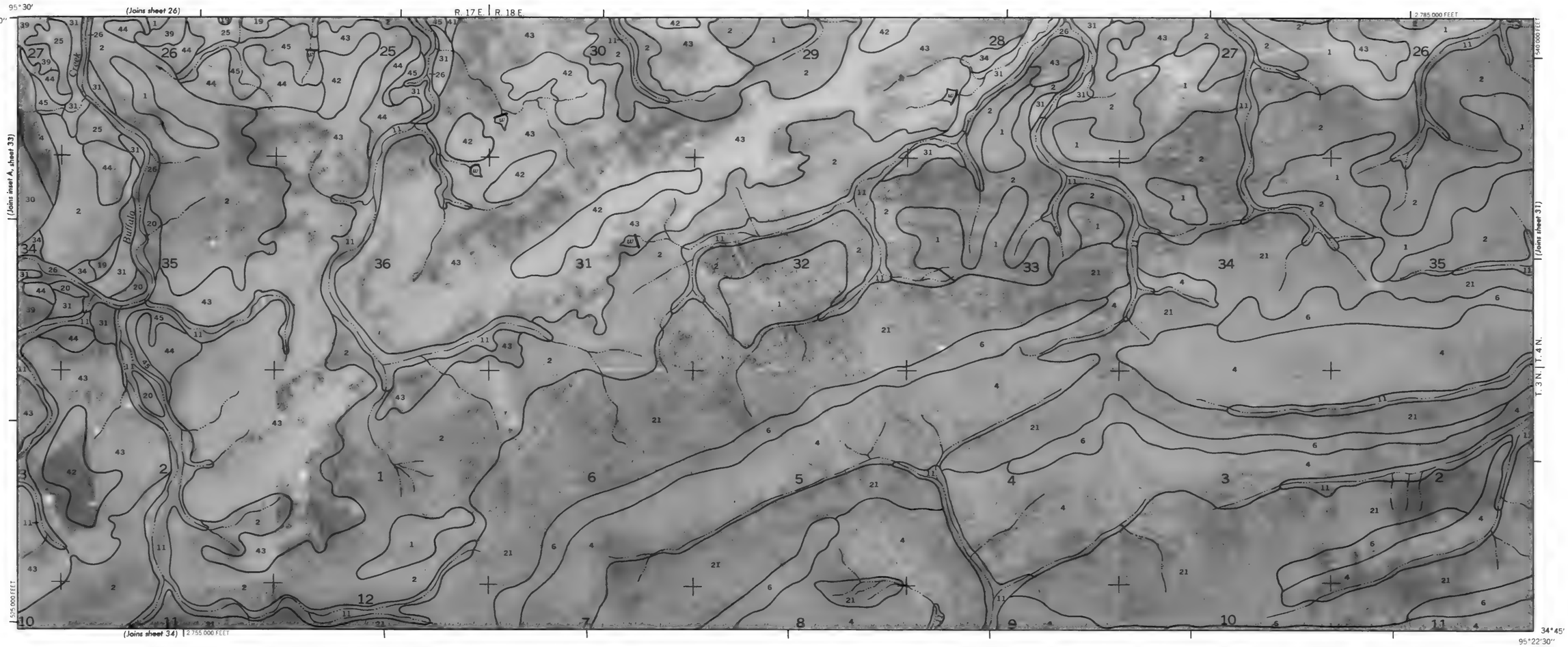
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

LATIMER COUNTY, OKLAHOMA NO. 29

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.



5000 4000 3000 2000 1000 0 5000 10000 Feet

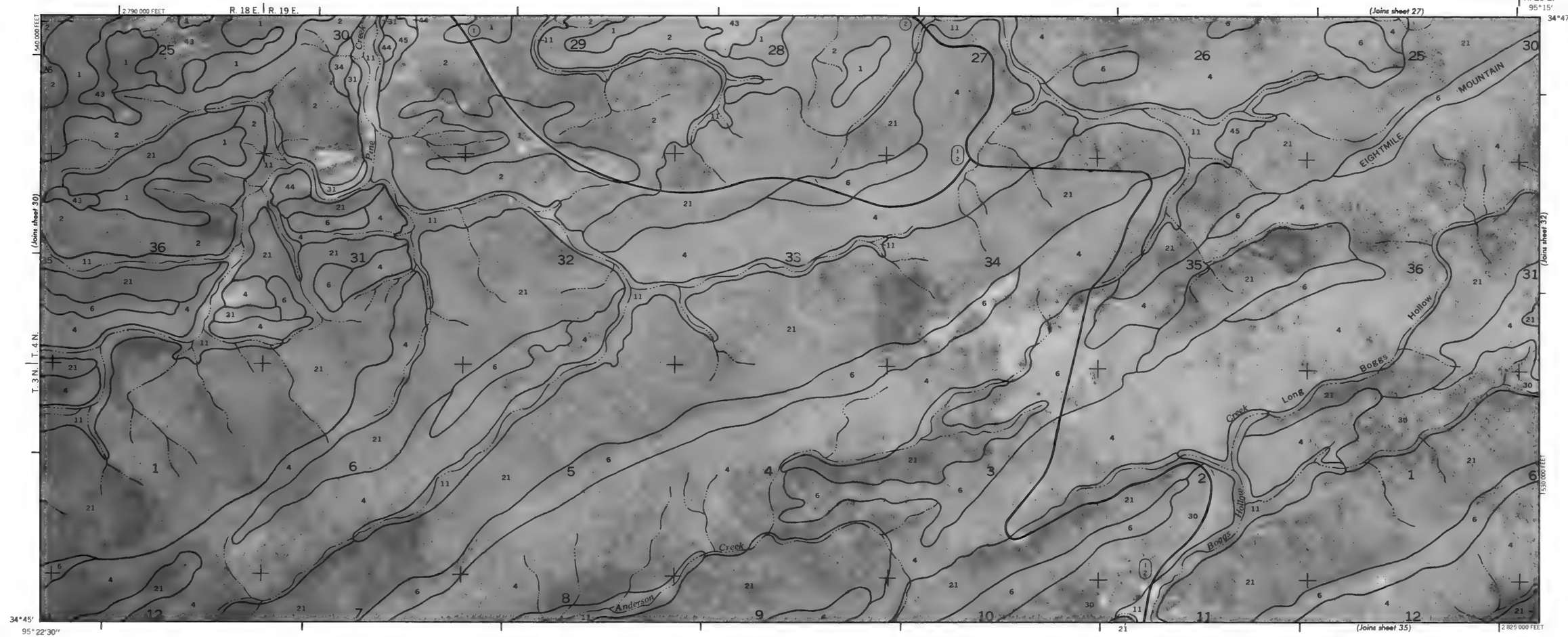
1 .5 0 1 2 3 Kilometers

Scale - 1:24000

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 30

N



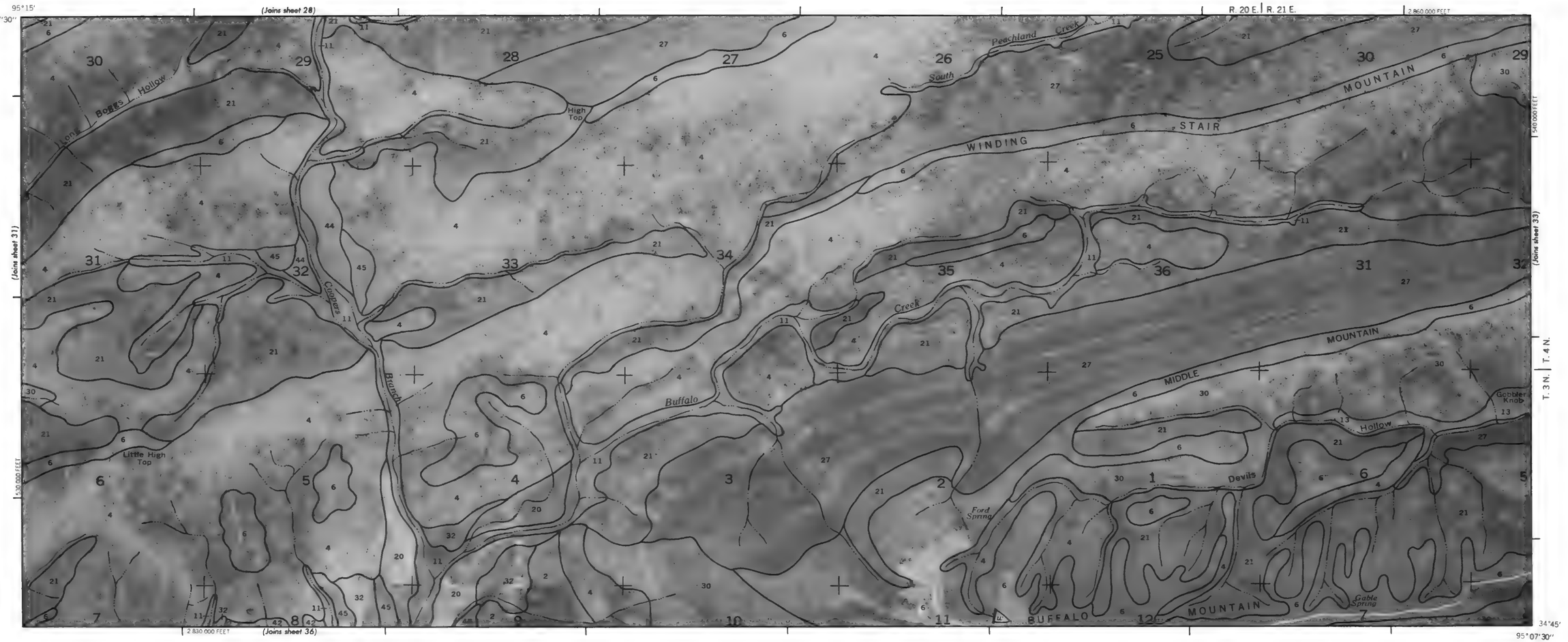
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

LATIMER COUNTY, OKLAHOMA NO. 31

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

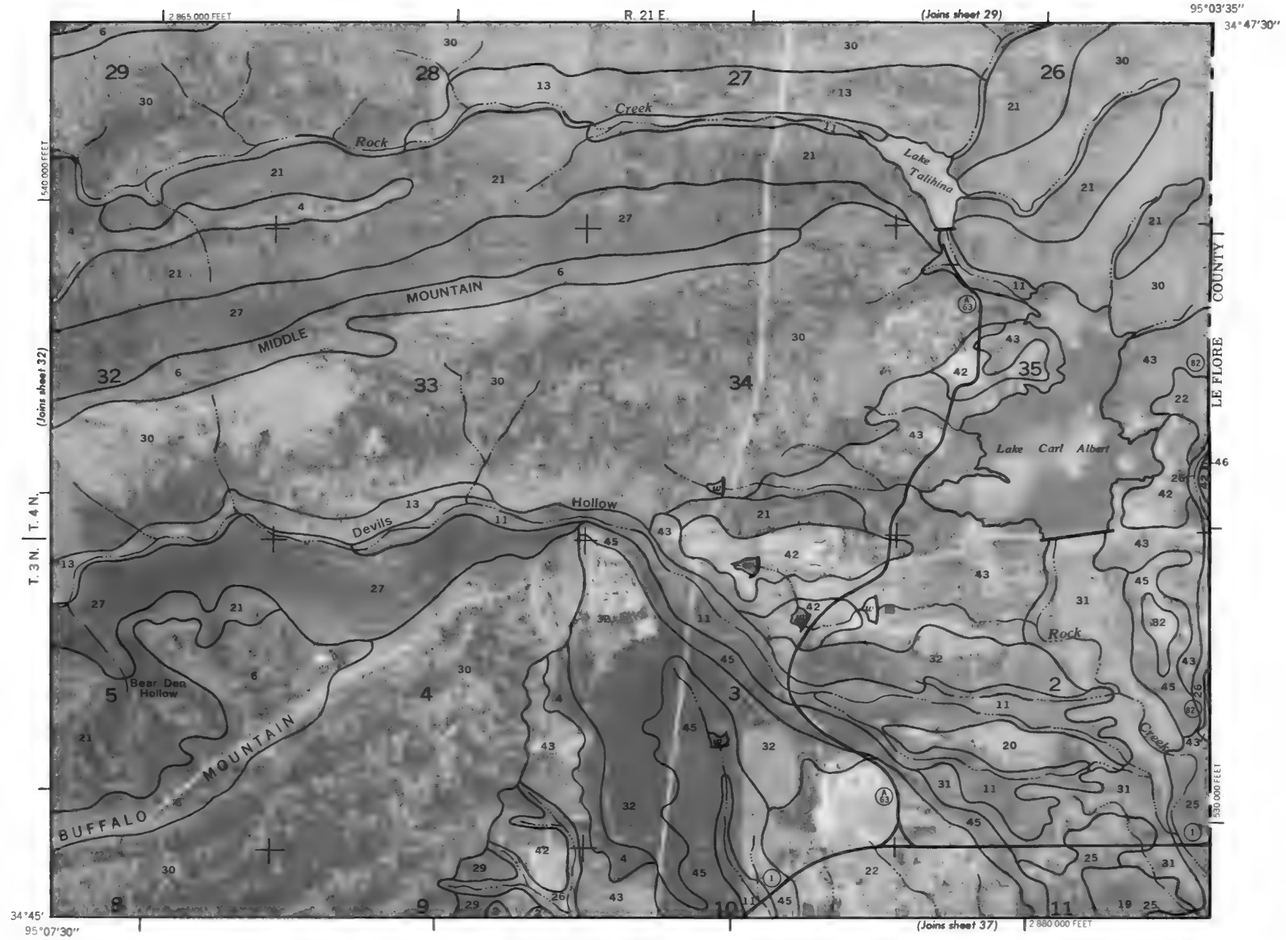
Scale - 1:24000

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

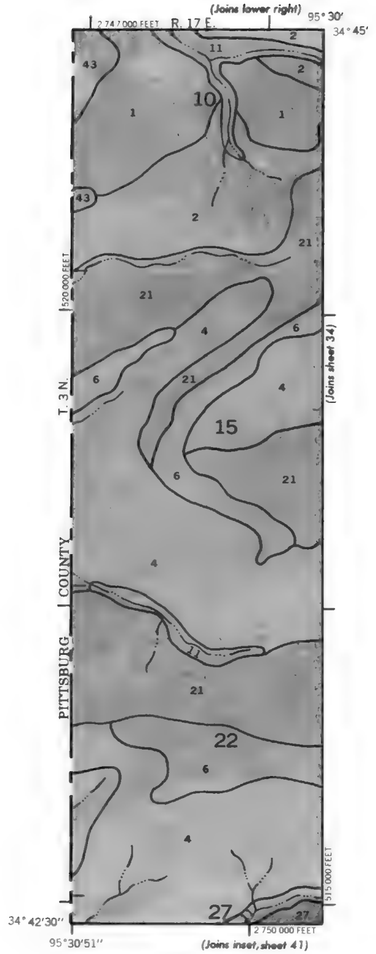
LATIMER COUNTY, OKLAHOMA NO. 32

N

LATIMER COUNTY, OKLAHOMA NO. 33

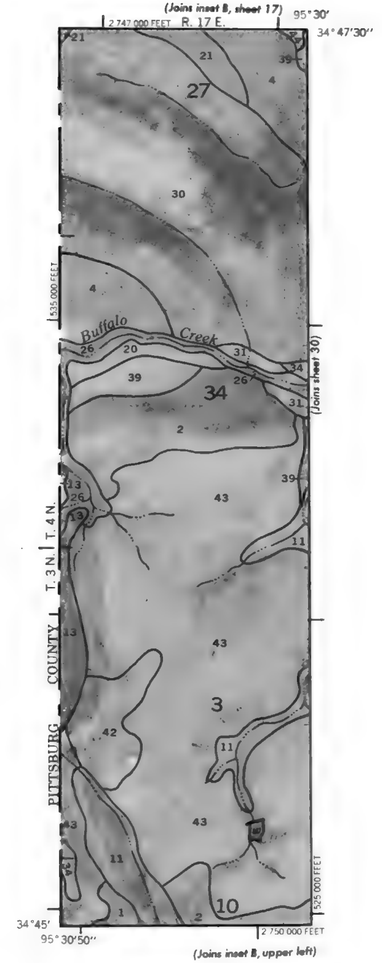


INSET B

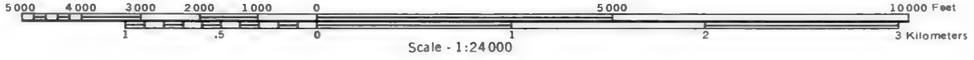


3000 AND 5000-FOOT GRID TICKS

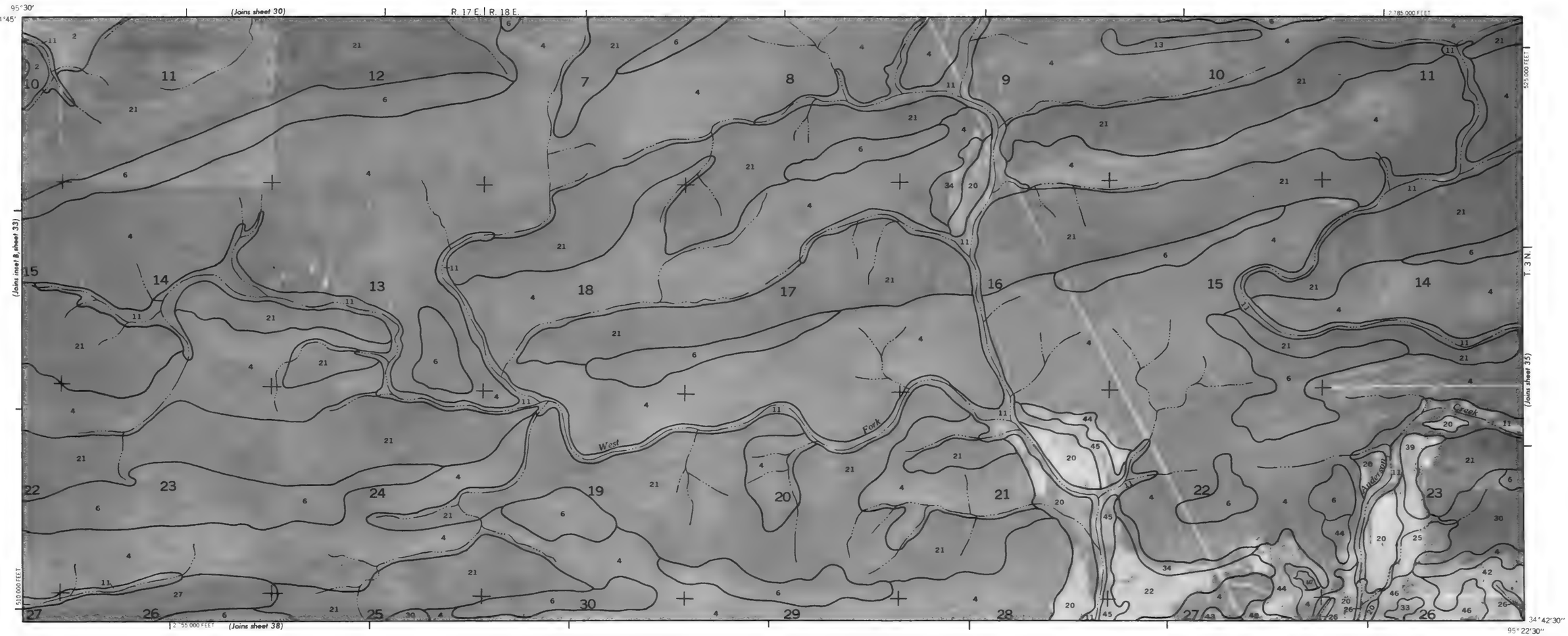
INSET A



3000 AND 5000-FOOT GRID TICKS



Scale - 1:24000



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

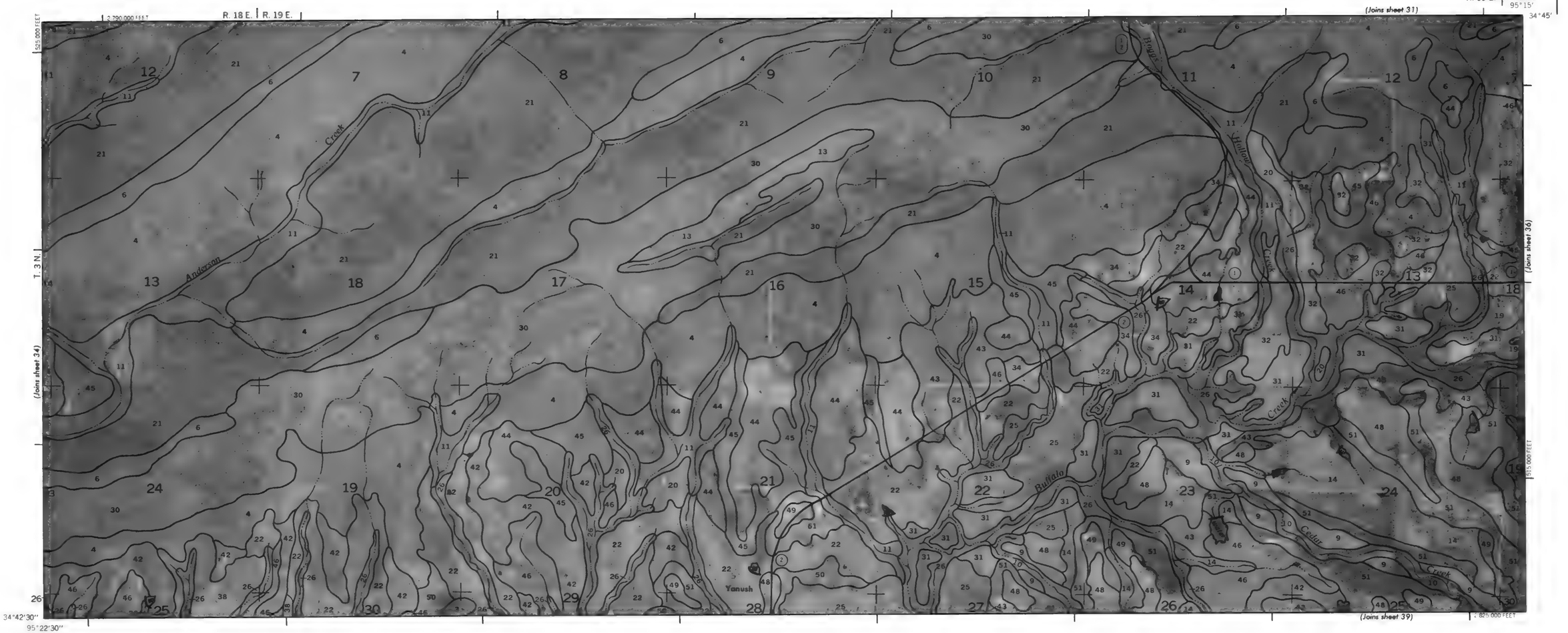
This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 34

N

LATIMER COUNTY, OKLAHOMA NO. 35

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.



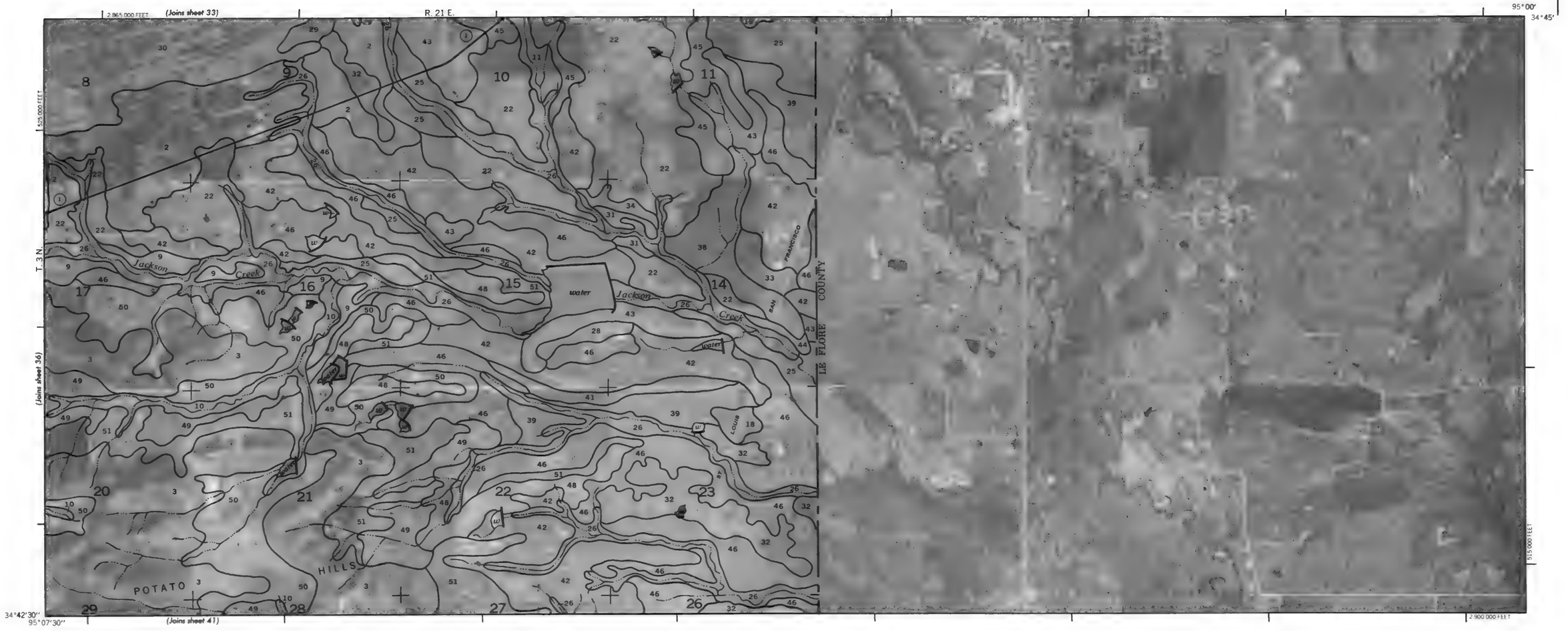
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 36



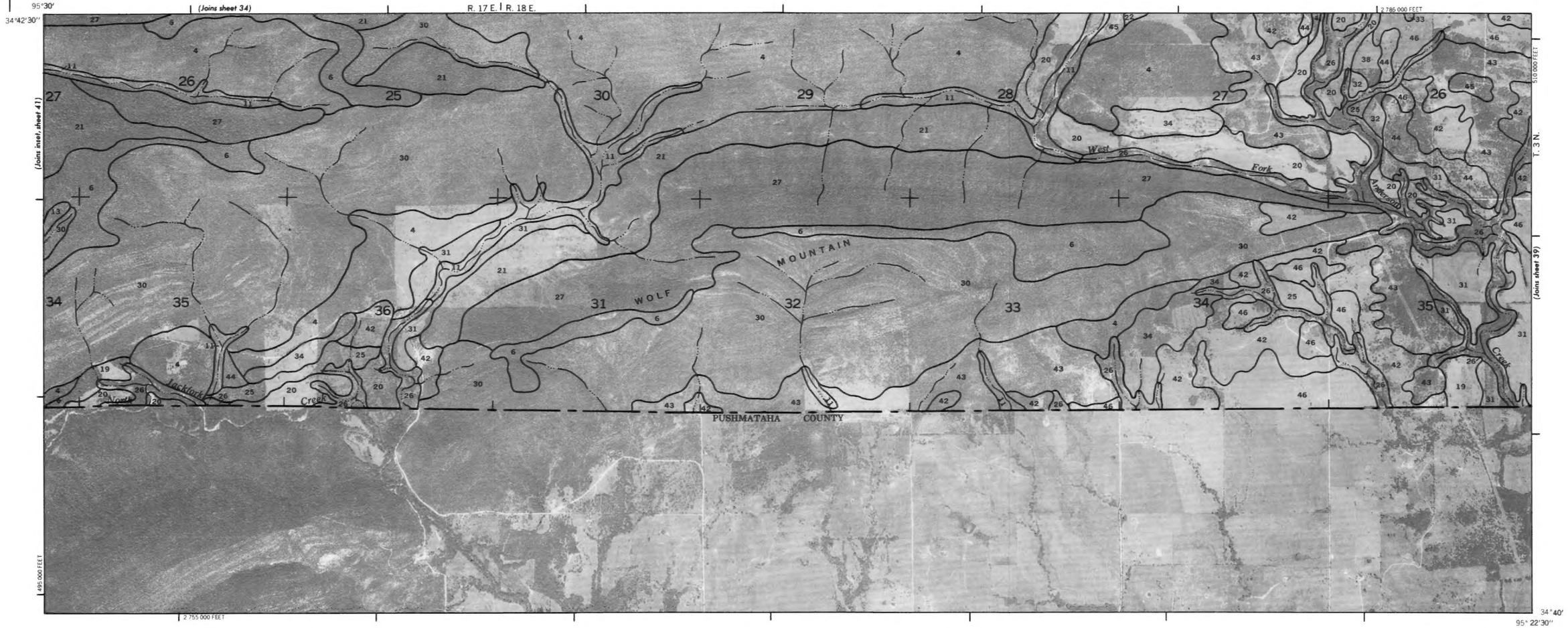
5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

N

LATIMER COUNTY, OKLAHOMA — SHEET NUMBER 38



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

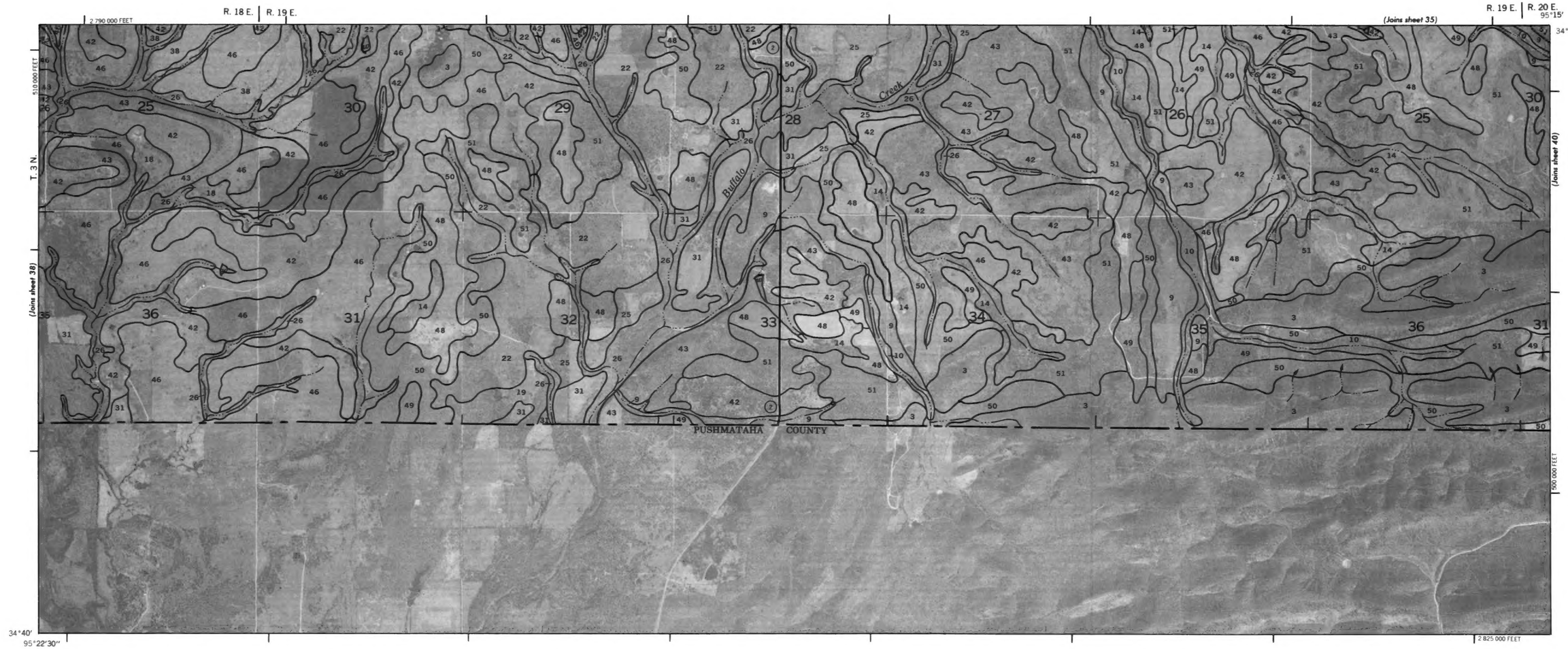
Scale - 1:24000

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA — SHEET NUMBER 39

39

N



5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24 000

LATIMER COUNTY, OKLAHOMA NO. 39

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA — SHEET NUMBER 40

This map was compiled by U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies on 1977 orthophotography obtained from U.S. Department of the Interior, Geological Survey.

LATIMER COUNTY, OKLAHOMA NO. 40

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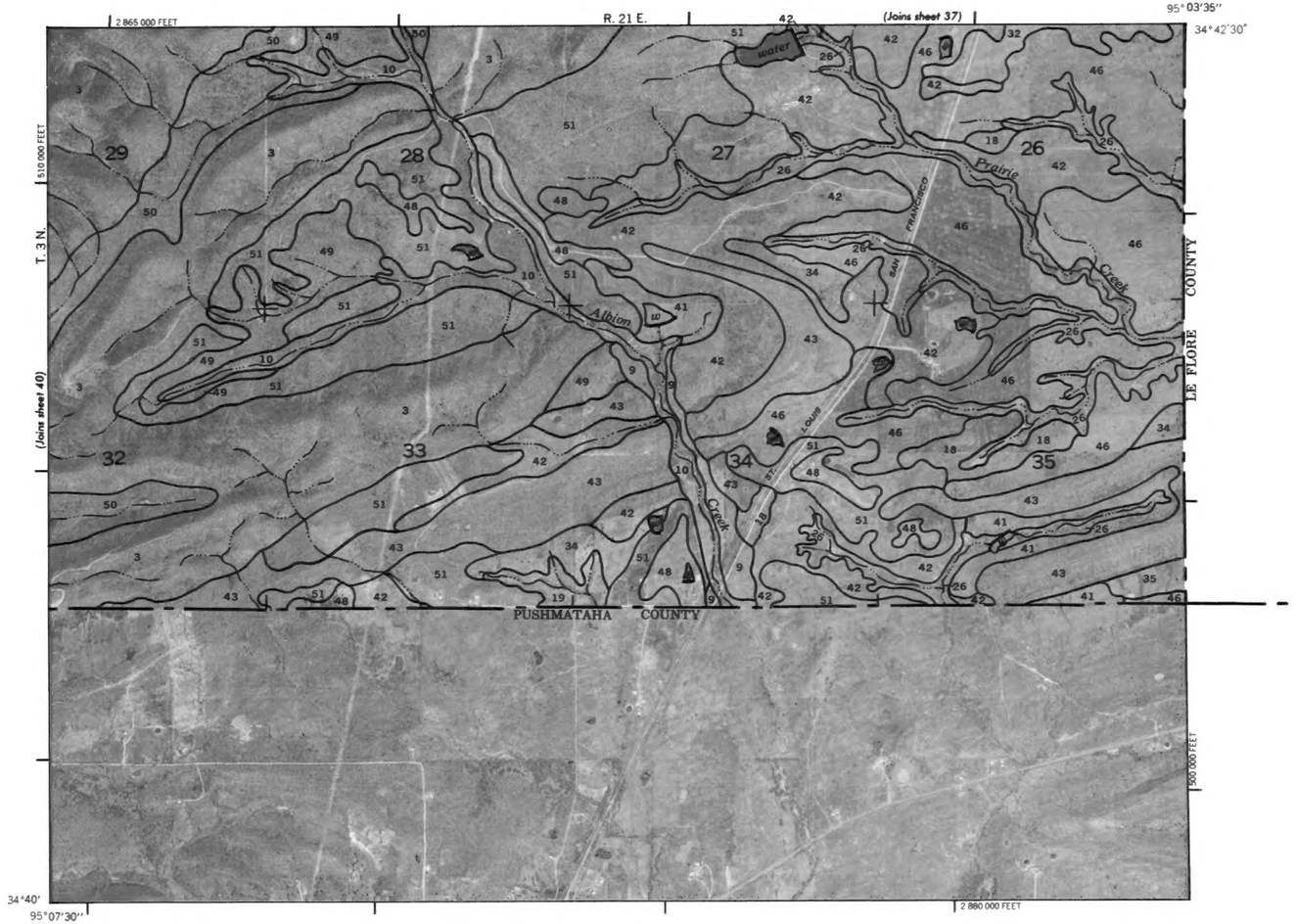

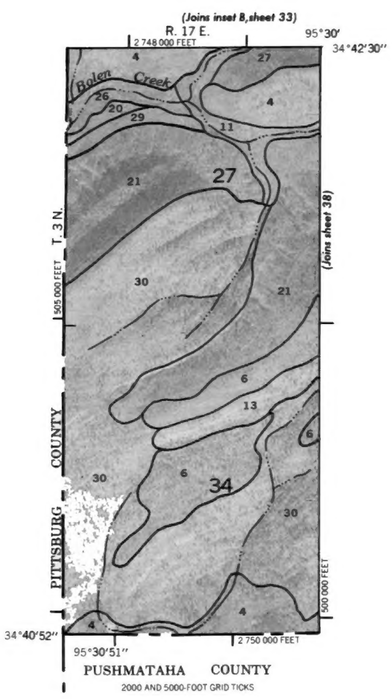

5000 4000 3000 2000 1000 0 5000 10000 Feet

1 .5 0 1 2 3 Kilometers

Scale - 1:24000

LATIMER COUNTY, OKLAHOMA NO. 41

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